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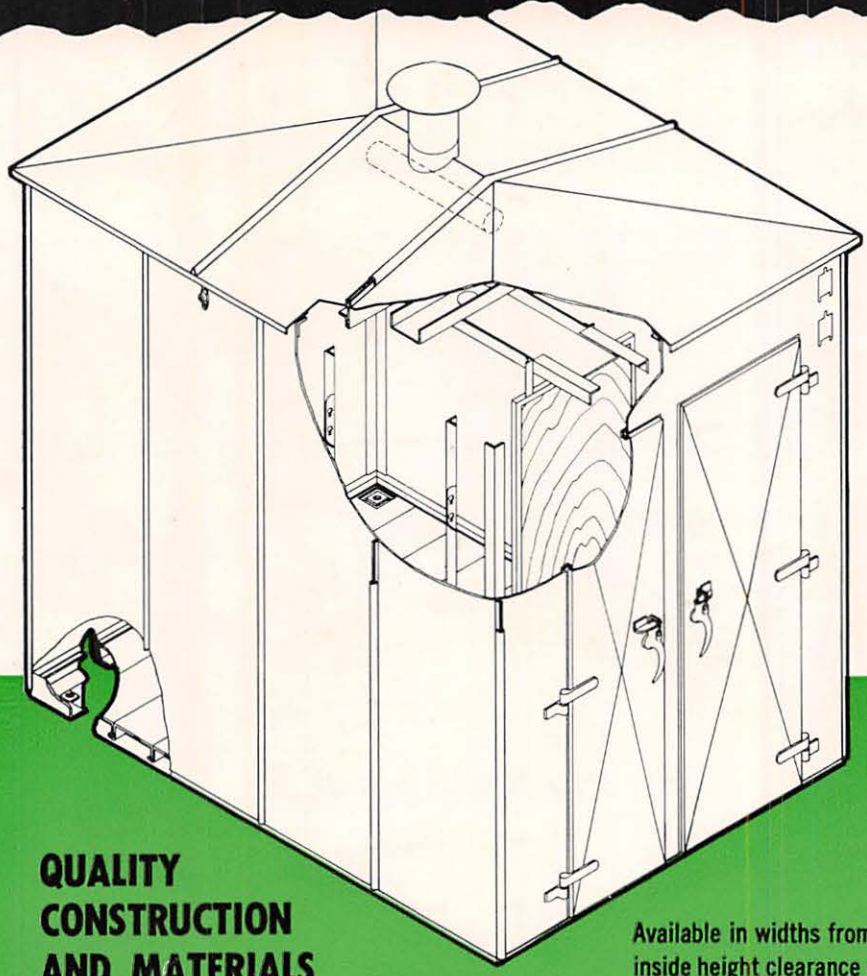

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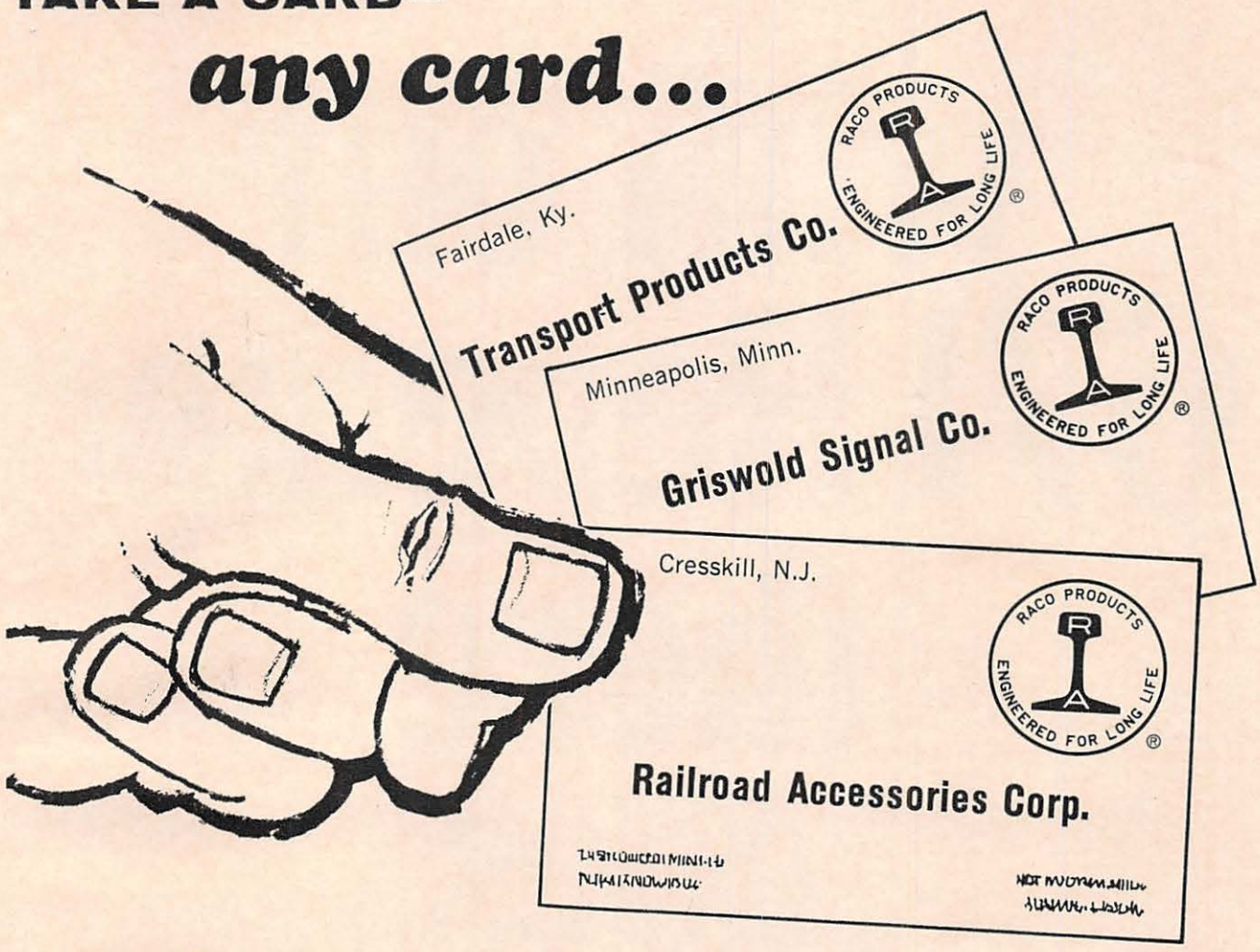

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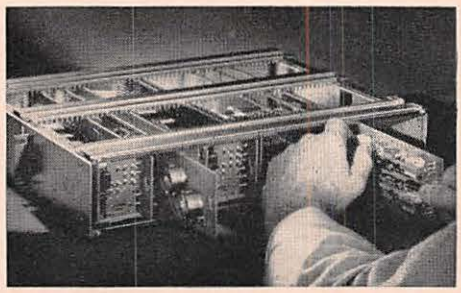

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June 1965
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EDITOR'S CORNER

With the rapid advance of technology, the thought comes to mind that the signaling and communications area may be too broad and complex for one man to fully understand it. The age of specialization is here, not only in college but in railroading. For example, several railroads' communications departments have engineers for each of the following fields: electronics, radio, inside plant, outside plant, data transmission and EDP, etc. On the signal side you will find engineers for each of these areas: circuits, highway grade crossing protection, CTC, etc.

Might it not be worthwhile for the Communications and Signal Section, AAR, to hold concurrent technical sessions on signaling and communications? Such a plan, I envision, would be similar to the annual March meeting of the Institute of Electrical and Electronics Engineers. Separate sessions or seminars would permit the presentation of detailed, technical papers aimed at a specific audience. The concurrent sessions would force members to attend those meetings in which they had particular interest. There would be few if any sleepers in the audience. While attendance at each session would be smaller than now, total attendance would probably be greater because of the greater interest. Separate meetings would also tend to eliminate the mass exodus we have seen in recent meetings when one group of engineers would rather visit exhibits than to listen to a paper in which they have little or no interest.

And last, but by no means least, presentation of technical papers to a more select audience should eliminate or materially reduce the number of bland, general papers that are written to interest everyone.

If a complete break-away from the full joint sessions is not advisable, I, for one, would like to see a first-day joint session followed by two days of intensive technical meetings —devoted to signaling and communications separately.

Bob McKnight

General Electric designed and installed the country's largest private microwave system

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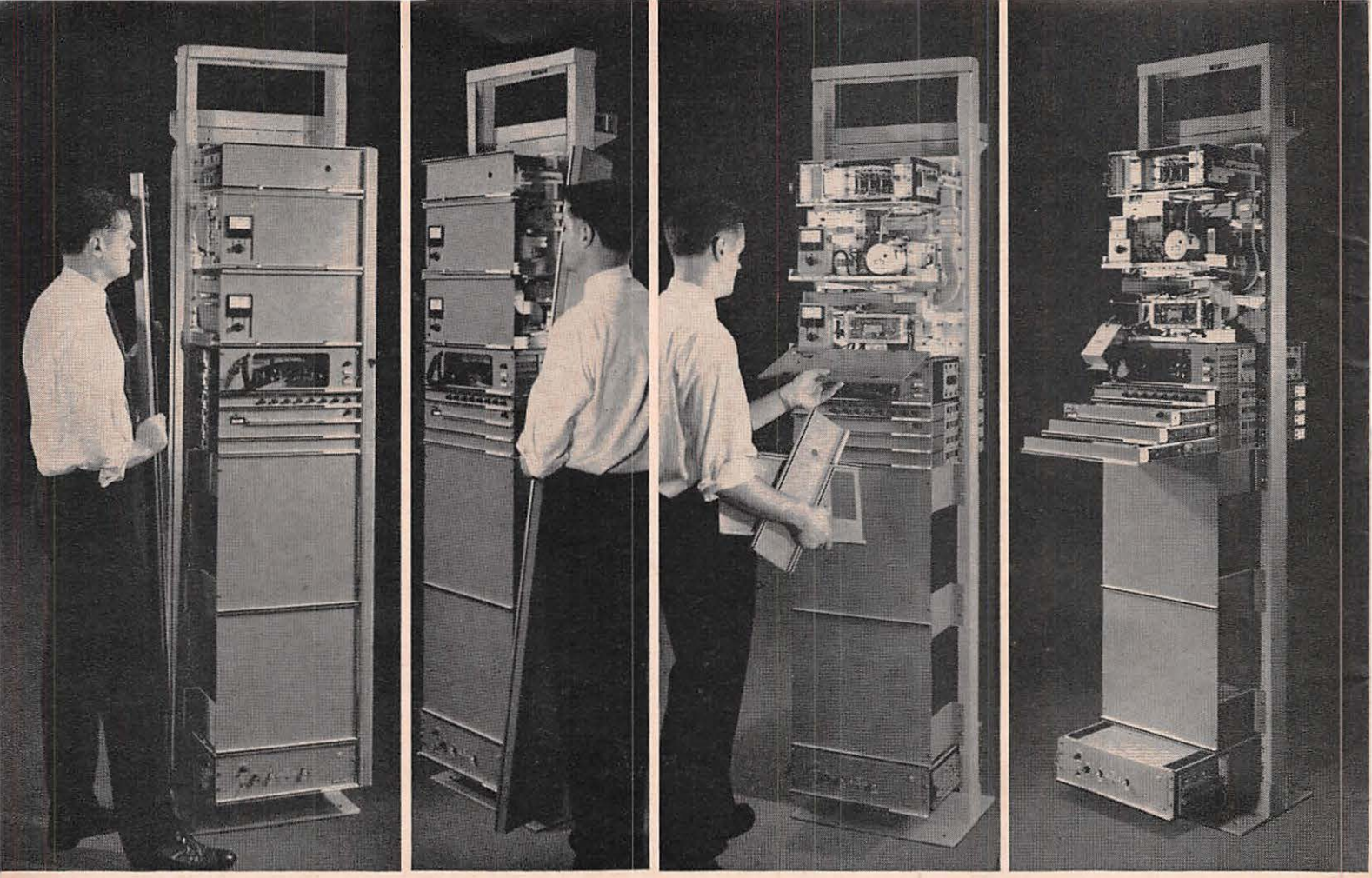

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NEWS BRIEFS

• ALGOMA CENTRAL & HUDSON BAY has ordered a complete highway crossing protection system from General Railway Signal Co.

• AUTOMATION'S IMPACT on communications, particularly on the Bell System is the subject of a report prepared by the Diebold Group for the Communications Workers of America. Two aspects in the report of particular interest to railroaders are interconnection and Telpak. Concerning interconnection or "interface" as the report notes, are the following comments:

"Voice equipment 'foreign' to the Bell System cannot be connected to the public dial network without first passing through a dial subset. However, two major breakthroughs are expected to occur during the next two to five years that will help to ease the current incompatibility between private and public networks: a sharp decline in the monthly rental of the Bell System's data subsets to 33 to 50% of their current cost . . . . The establishment of a tariff that would enable private communications facilities to be interfaced (through a relatively expensive interface that will protect the public network circuits) with the public dial network.

"If these breakthroughs materialize as expected, complete flexibility will be achieved in the use of communications facilities, thus maximizing the effective demand for both voice and data communications."

The Diebold report reviews the Telpak situation and makes the following comment regarding American Telephone & Telegraph Co.'s position after the recent tentative Telpak decision:

"AT&T will have to agree to provide the entire Telpak capability on a single routing and over a single carrier in order to prove a cost reduction as opposed to individual lines . . . The rates for the less costly Telpak A and Telpak B are likely to be increased somewhat, perhaps as much as 30%, in order not to discriminate unduly against the user of individual private line circuits.

"There is also a reasonable possibility that the entire tariff might have to be revoked, as was the WADS (wide area data service) tariff proposal . . . If this should occur, there would be substantial moves by such companies as Motorola, Collins, Western Union and others to provide similar extended microwave facilities to serve the individual needs of large companies.

"In addition to the problems of interface and the Telpak tariff, the Bell System in particular, must make its facilities competitive in terms of equipment and service with private networks which larger corporations might well find cost effective to establish."

Communications and information systems were also covered in the Diebold report, which had this to say with respect to future developments:

"Whether or not the Bell Telephone operating system is able to participate, the integration of communications into the expanding area of information technology will take place . . . and by the end of this decade a large number of industries in the U.S. will have gone over to general use of communications links for their on-line information systems.

"By 1971 to 1975, major integrated data processing and communications systems will be in common use. The choice between types of communications carriers—whether private, Bell or other—is still open. Undoubtedly the Bell System, with its network of communications facilities which are either available or adaptable, with its great investment in research and development, and with its accumulative experience growing out of the first two assets, stands in a most advantageous position . . . It is expected that the communications switching system of the next decade will interface with the Bell System dial network—either alone or with an accompanying private network, as particular con-

(Please turn to page 28)

This Was News 50 and 25 Years Ago

The Signal Engineer, June 1915. Toronto, Hamilton & Buffalo installs absolute permissive block signaling on 60 miles of line between Welland and Brantford, Ont. Trains were formerly operated by the telegraph block system in connection with train-order boards, and in some cases by standard semaphore train-order signals.—Tests of Jones Train Control system are completed on the Maryland & Pennsylvania. The train stop and cab signal system was tested on approximately 9 miles of track, with 40 locomotives being equipped operating between Baltimore and Homeland, Md. The system is the intermittent electrical contact type using contact rails, which are inverted T-sections about 40 ft long. —Atlantic Coast Line installs double-track automatic block signaling on 65 miles of line between Selma and Parkton, N.C.

Railway Signaling, June 1940. South African Railways installs route-type interlocking at Johannesburg to handle 1,000 movements daily. The new plant extends over an area about 1.5 miles long, and includes 14 single switches and 22 crossovers operated by a total of 58 power switch machines, 40 running signals, and 33 signals for directing switching movements.—Norfolk & Western installs automatic block signaling on 7 miles of double track and 9 miles of single track between Weller Yard and Luke, Va. Also included is the installation of CTC on 9 miles of single track and passing tracks between Luke and Home Creek, Va. The automatic block signals on the double track are controlled by polarized track circuits to display three aspects. In order to minimize the contact resistance and thus insure proper operation of these polar circuits, a special arrangement of 1,000-ohm polar, 250-ohm neutral and 4-ohm polar track relays was used to permit contacts to be used in multiple.—Louisville & Nashville has extensive network of railroad-owned telephone facilities using interconnected private automatic exchanges. **RS&C**

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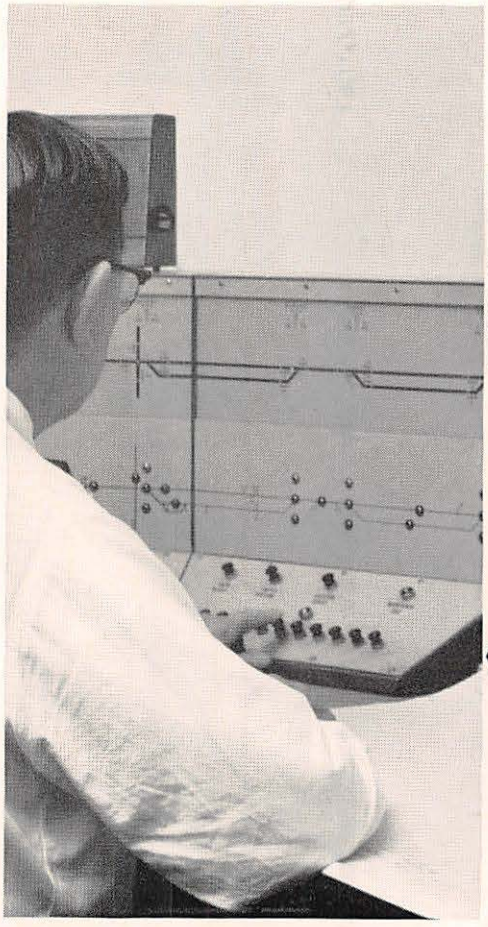

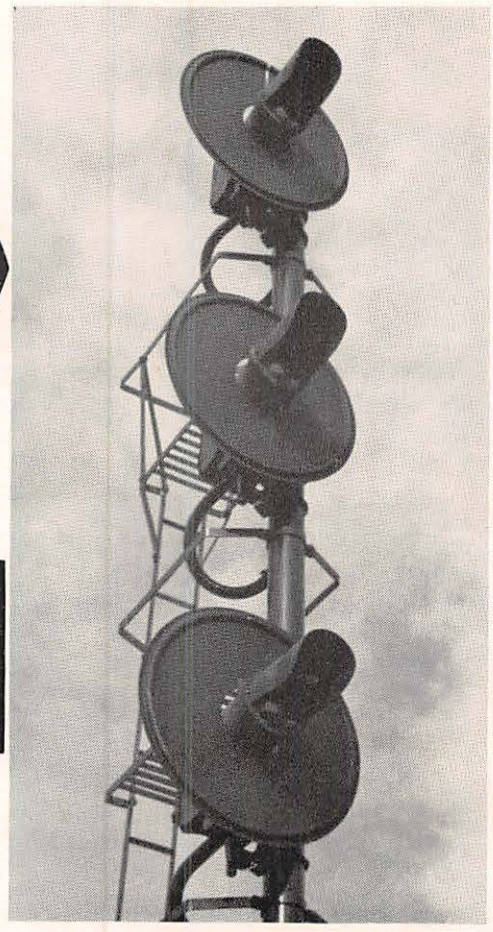

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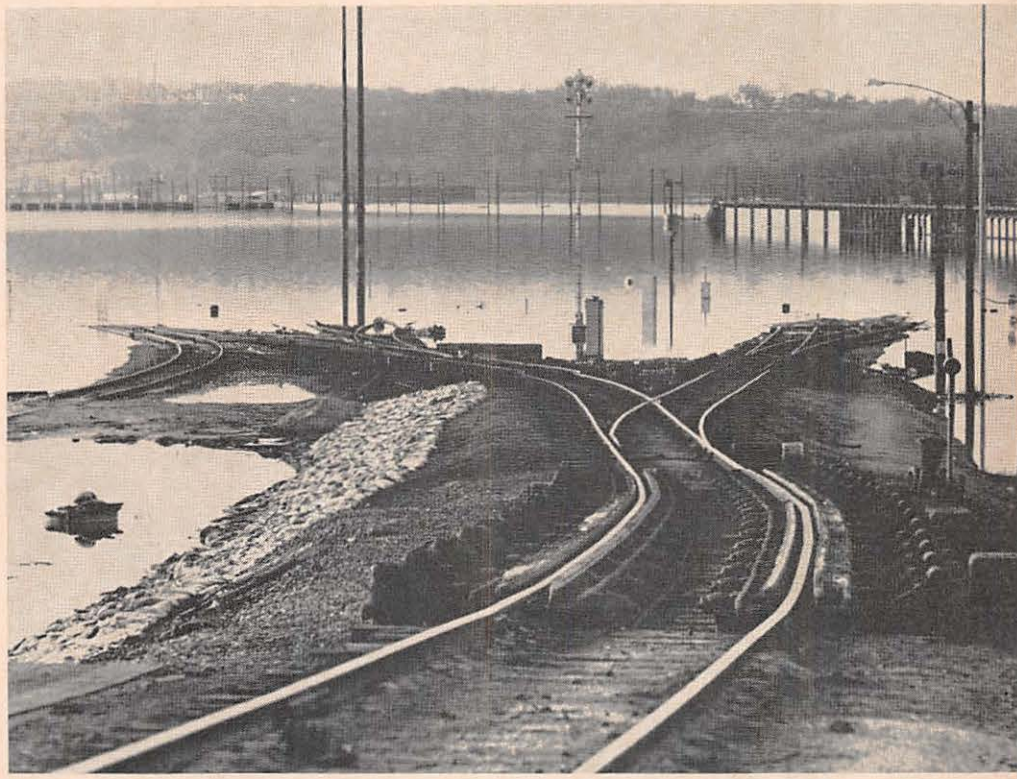
Midwest RRs fight the weather

Since February of this year, midwestern railroads have been subjected to sleet storms, tornadoes and floods. Most disastrous was the Mississippi river flood in late April. Although property damage will run into millions of dollars, signal and communications facilities came through relatively unscathed. For example, many roads reported pole lines down or flooded in some areas, but otherwise damage was slight. Reporting that Northern Pacific had no communications damage because of flood conditions, superintendent of communications Don Hill said: "I guess we must be living right up here." However a big factor is probably due to the relative ease with which S&C equipment can be moved away from flood areas.

Also, advance planning and prompt action by S&C departments helped to minimize flood damage. Most roads, alerted to possible flooding, followed the general practice of removing equipment from cases, bungalows, towers and offices before flooding occurred. In some instances, it was only necessary to raise cases or equipment a few feet to place them above the high water level.

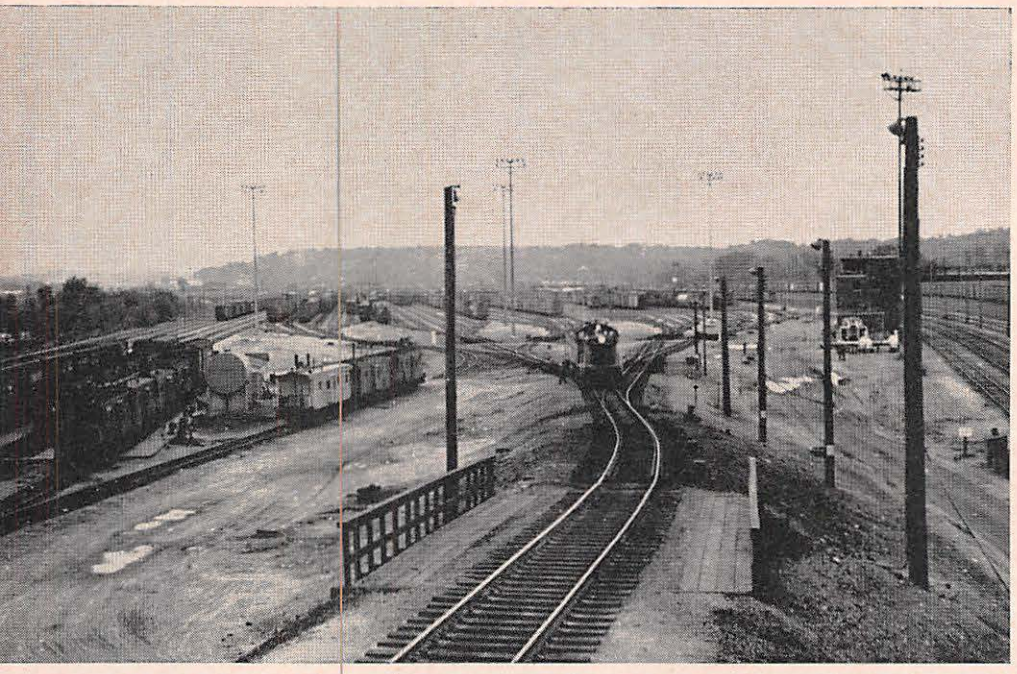
Illinois Central's general superintendent communication and signaling George Pipas, in reporting to this *Railway Signaling and Communications* flood survey, said: "We were spared extensive damage in our facilities, as the only extent of the flood was through the Dubuque, Ia., yard area, which in most part is non-signaled. We did have a small amount of damage at an interlocking and a crossing protection installation. The major expense involved labor in removing or raising such items as switch machines, signal cases and batteries which was done prior to the crest, enabling us to save this equipment from damage."

Other railroads were not so fortunate, such as the Milwaukee Road.



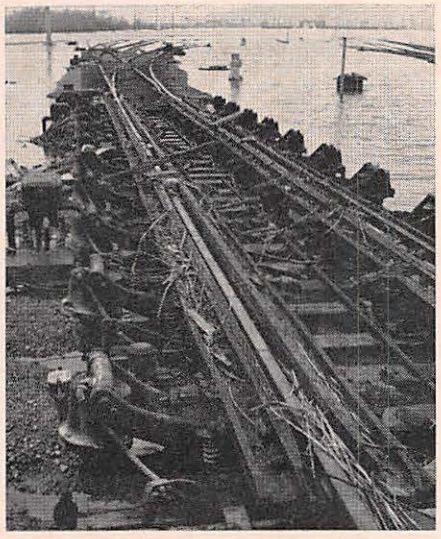
Water covered Milwaukee Road's St. Paul, Minn., classification yard to a depth of about 8 ft. This is view from hump looking northward.

Storage tanks (below) were bled of air and filled with water to hold them down. Pneumatic tube line (far left) has sand bags at post positions for weighting.



When restoring MILW yard to service, switch engine was run over class tracks several times to wear off rust and restore shunting sensitivity.

Retarder tower was sandbagged to prevent debris from damaging building.



After water receded from retarders debris remained to be cleaned out.

Its St. Paul, Minn., automatic classification year was under about 8 ft of water. In a major operation, the road's S&C forces worked 12-hr shifts about four days removing equipment to get it above flood waters. On April 12, the yard was completely out of service, after four days' work removing equipment and taking other preventive measures, such as placing sand bags to a height of 8 ft against the retarder tower's walls. On April 16, the flood crested at 26 ft, which was 12 ft above flood stage at St. Paul. By April 28, flood waters had receded to the point that S&C gangs were able to enter the yard. They replaced equipment, cleaned out debris and had the yard back in service by 12:01 am, on May 5.

Like the MILW, the Burlington was affected by the Mississippi river flood at several locations. In practically all cases, signal equipment was removed prior to flooding. At the Green Bay & Western crossing at E. Winona, Wis., a CTC machine was removed from the tower, loaded into a box car and hauled to higher ground. The mechanical interlocking, controlling the crossing, was severely damaged due to flooding of the track. The roadbed was under cut, in some places to a depth of 30 ft. This mechanical interlocking will be replaced with an all-relay plant.

A. L. Essman, chief signal engineer, system, CB&Q, reported that in other flooded areas signal gangs removed switch machines, instrument cases at highway crossings where flashers and/or gates were in service, and other trackside equipment prior to the arrival of high water. At one interlocking where water had covered the tracks after removal of switch machines, the adjacent relay bungalow began to list due to the water undercutting its pile foundation. Fearing that the bungalow would topple over, and because a crane couldn't get in to lift it out, signalmen removed the relays and other equipment. With so little time, the wires to relays were cut with pliers, and men inside the bungalow tossed the relays to others outside. Relays were literally "relayed" from the bungalow to safe storage above water. In this case, the bungalow didn't topple, but Mr. Essman said they just couldn't take the chance that it wouldn't go.

MOVE EQUIPMENT

This was just one of several instances where removing equipment turned out to be unnecessary, but the cost of replacement plus the delay to trains and possible detouring for long periods of time made this rule apply: "If in doubt, lift it out." MILW signal forces removed a CTC machine from the Chestnut Street tower in St. Paul. Also, they removed storage units, relays and other associated equipment of a US&S type 504 code system. Equipment valued at approximately $75,000 was removed to higher ground. Although the flood waters actually rose to only track level at the tower, the equipment was moved because of the possibility of flooding if a nearby dike did not hold. It held, but MILW engineers said they couldn't take the chance of having the equipment flooded.

In one section of CTC, CB&Q signal forces directed removal of the concrete bungalows at the ends of sidings. A work train was called out, and its crane was used to lift the bungalows into gondolas or flat cars. At these and other signal locations, batteries were taken out of battery boxes or wells. To keep the wells from "popping" out of the ground when flooded, they were

filled with water to help hold them down. A similar practice was followed by MILW signal forces at St. Paul yard. The air storage tanks and pipe lines were bled of air and filled with water to help keep them in place.

LINE WASHED OUT

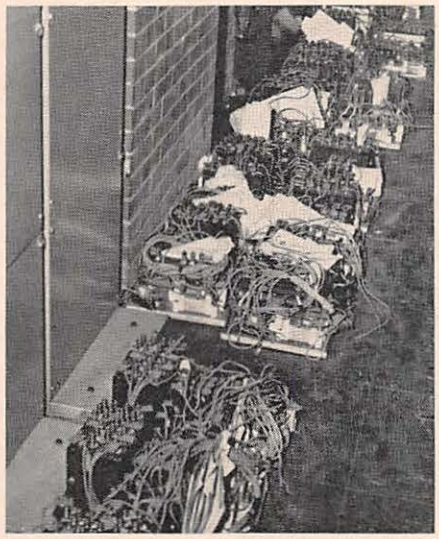
At Winona, Minn., CB&Q had several sections of line washed out, including communications lines. Affected sections varied from 100 ft to 450 ft in length. T. W. Wigton, CB&Q, general superintendent communications, tells how communications was restored: "We laid two 3-pair direct buried cable for a distance of approximately 3,000 ft in the water. In other sections we resorted to pair wire, all of which gave us reasonably good communication, at least for our message and block circuits, which were badly needed by the crews making repairs to the railroad."

"At a small town on our Chicago to Denver mainline, near Gulfport, Ill., some 800 ft of the two mainline tracks were completely washed out and, of course, took the pole line with them. Again, to provide emergency service, we laid figure 8 cable over a 2,500 ft. section, some of it in the water, and where trees were available we strung it in the trees."

Estimated cost of material and labor for pole line replacement on the Burlington is approximately $50,000 according to Mr. Wigton.

Chicago Great Western experienced flooding by the Mississippi at St. Paul and South St. Paul, Minn., and at Dubuque, Ia. Flood walls and temporary dikes placed across its tracks caused the road to suspend operation at these locations for periods of time. "Under these conditions," notes A. E. Smith, assistant general manager-chief engineer, "we were able to sand bag instrument houses and remove switch machines, relays, batteries, crossing signal mechanisms, etc., to a point high and dry, and then restore this equipment after the flood waters began to recede. By the time the waters had lowered to a point where flood walls and dikes could be opened to permit train operation, all equipment had been restored to service with only nominal loss or damage."

Sand bags were placed along side of the hump to prevent water from washing away soil and ballast. Here is removal of sandbags after water has receded.



Electro-pneumatic switch control valves were stored in tower.

Retarder control valves are examined after water receded.

Mr. Smith reported that CGW had no communication equipment destroyed or damaged. Some equipment was removed from low lying areas before flooding occurred and returned after the flood waters had gone down.

"We most assuredly depended on two-way radio particularly between mobile units to shorten the time in which it was necessary to remove and replace both signal and communication equipment during this time of disaster." These comments by Mr. Smith were echoed by many other railroad men. Some railroads used radio-equipped locomotives for base stations. Extensive use was made of walkie-talkies by superintendents, trainmasters and other operating officers.

Illinois Central found radio a necessity in expediting its track raising, train operations and generally keeping the railroad open as much as possible at Dubuque, Ia., during the Mississippi river flooding.

E. H. Buelow, IC general manager, said that they had used Motorola two-way radio for every part of the track-raising and train-guidance operations.

"To organize our work teams when the water started getting higher, we began to use radio for dispatching and assigning work.

Once assigned, we would give the engineer and conductor a radio. The work train would move down the track looking for low spots in the railroad bed, or potentially dangerous side-track areas. The conductor would tell the engineer where to stop, and operations would proceed from there. Laying track and foundations for raising track is no easy operation, but because of radio, we saved manpower, and an even more important commodity at that point—precious time."

Two-way radio also played an important role in the operational factor of trains moving through the flood area. Through an emergency center located in the IC freight office, an office accessible by boat, two dispatchers worked around the clock checking with two other radiomen, stationed at the east and west end of the flooded area. These supervisors had continuous contact with each other, the main station and men aboard the train who were warned of any possible trouble along the way.

"We would never have been able to coordinate these 'items' without radio," said John Dodge, IC division superintendent. "We used it to help unload the slag used to build up the track, kept our communications open throughout the flood operation, and our stations at Wood Crossing and Dubuque Junction were all equipped with radio to control trains from beginning to end."

WALKIE-TALKIES USED

The railroad used 11 Handie-Talkie units, and 5 Motran units to facilitate communications work. IC boats were also equipped with radio to follow track operations and to report back to the dispatch center at certain points along the route.

The electrical foreman was equipped with a radio that kept him in constant communications with the men along the line. As soon as trouble popped up, he went with a crew to the trouble spot to correct breakage and work hold-ups. The master mechanic and all IC division officers were also equipped with radio.

Not all flooding occurred in April. As early as March, Chicago & North Western was subjected to flooding of the Boyer river in western Iowa on account of an early thaw. Esti-

Relays removed from instrument case prior to flooding.

mated damages to signal equipment from this one instance were $2,000 for labor and $2,900 for material. Unfortunately, this was a prelude of what was to come later. Estimated flood damages including cost of removing equipment and taking other preventive measures, totaled approximately $35,000 for C&NW signaling. All was not bad, the road had some near misses. For example, at East Clinton, Ia., the signal bungalow housing the control apparatus for the interlocking with the MILW was high enough to be out of the water, although the crossing itself was under water.

At Clinton, Ia., reports signal engineer V. S. Mitchell, the water was 2 ft deep in the maintainer's headquarters. This building houses the generator and batteries for operating the swing bridge over the Mississippi river channel. The batteries had to be raised to keep them out of the water. Outside this headquarters building, a new 60 cps to 100 cps solid-state converter unit for providing automatic train control energy had to be raised about 2 ft. The ATC system remained in service.

A major removal job was accomplished by MILW signal and communications forces at the road's St. Paul automatic classification yard. Because the yard is alongside the Mississippi river, the danger of flooding was obvious. About the only question was—how high would the water rise? Alerted by Army Engineers about possible flood crests, a decision was made to remove S&C equipment from potential flooding areas. Electrical equipment located on the ground floor of the retarder tower, including electric motors associated with the air compressors were removed. Also taken out of the building were transformers, rectifiers, electric power panels and terminal boards.

REMOVE EQUIPMENT

Communications equipment was removed from the telegraph office that was located in the St. Paul yard office. Included were several carrier racks, teletype units, intercom and talk-back speaker consoles. Also, IBM equipment was moved from a ground floor room to storage on high ground.

Out in the St. Paul classification yard, electrical equipment was removed where possible. For example, the relays and associated equipment in instrument cases near retarders and power switches were removed. Also, the electro-magnetic control valves for the retarders and electro-pneumatic power switches were removed and temporarily stored on the third floor of the retarder building. Talk-back speaker heads and some signal heads were removed to prevent them from being flooded.

H. J. Dunn, supervisor signals and communications, directed the S&C men working on this removal, and later re-installation. General supervision of the operation was handled by W. E. Fuhr, assistant chief engineer signals and communications. Signal forces were under the jurisdiction of P. H. Linderoth, signal engineer, while D. H. Wylie, communications engineer was responsible for communications forces and their work. At other locations where equipment was removed it was carried out by S&C forces under the direction of the local supervisors, signals and communications. These men also supervised the reinstallation of S&C equipment, which generally required only cleaning and minor adjustments.

In addition to flooding at the yard, other areas in St. Paul re-

quired preventive measures to protect communications facilities. For example, the railroad's radio repair shop equipment in the roundhouse had to be removed and trucked to a temporary shop set up in Minneapolis. A telephone exchange including the automatic dialing units and carrier equipment had to be moved to a room in St. Paul's Union Station. Freight car number recording facilities were relocated to the east end of the yard out of high water.

Estimated costs for removing and re-installing S&C equipment is estimated to run in the neighborhood of $50,000. Although many miles of pole lines were flooded, only a few poles were actually lost.

SLEET STORMS STRUCK

Floods were not the only natural disasters to hit midwestern railroads during 1965. Beginning in January, severe sleet storms struck with their disastrous heavy loading of pole lines. As might be expected communications lines suffered. In most cases twist pair or other types of temporary wire was run in to provide communications. Also, many roads leased facilities from Western Union, Bell System and independent telephone companies to provide alternate routes for voice, telegraph and data circuits. Signal circuits were also affected, where handled in open wire lines. C&NW's experience is somewhat typical of what happens when sleet storms strike. The road's signal engineer, V. S. Mitchell explains:

"In January this year, there was a severe sleet and ice storm which occurred on a Saturday afternoon and evening knocking out commercial power at various locations, but mainly on our Northwest suburban line, especially in the vicinity of Palatine and Barrington, Ill. Signal and crossing protection batteries began to run down after about 24 hr. It was necessary to use signal and track forces to flag at the numerous highway crossings on this three-track main line.

"In addition, there were numerous places where the signal pole line collapsed under the weight of so much ice. Commercial power service was not restored to the railroad at Palatine until Thursday morning. Meanwhile, the Engineer of Work Equipment supplied an Electromatic Tamper as a power source. One phase of this alternator was stepped up from 110 volts to the normal 440 volts for the distribution line. We began recharging batteries late Monday afternoon. Expenses for signal forces were labor $23,000, material $3,000, totaling $26,000."

TORNADOES TOO!

Tornadoes have been visiting the midwest area, particularly in April and May. C&NW lost several short stretches of signal pole line on account of a tornado dropping down to earth near Crystal Lake, Ill. Estimated damage was approximately $9,000.

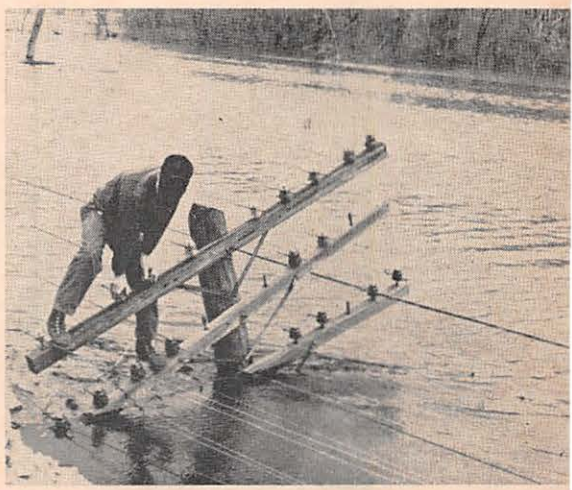
Soo Line had some pole line damage due to tornadoes and high winds, according to B. F. McGowan, assistant chief engineer, signals and communications. He reported that "a tornado damaged about five spans of our signal and communications pole line in the Minneapolis area. The damage was caused by trees blowing through or falling upon our pole line. Out CTC code line was restored to service within 4 hr, and other signal and communications facilities restored to temporary service within 24 hr."

POLE LINE DOWN

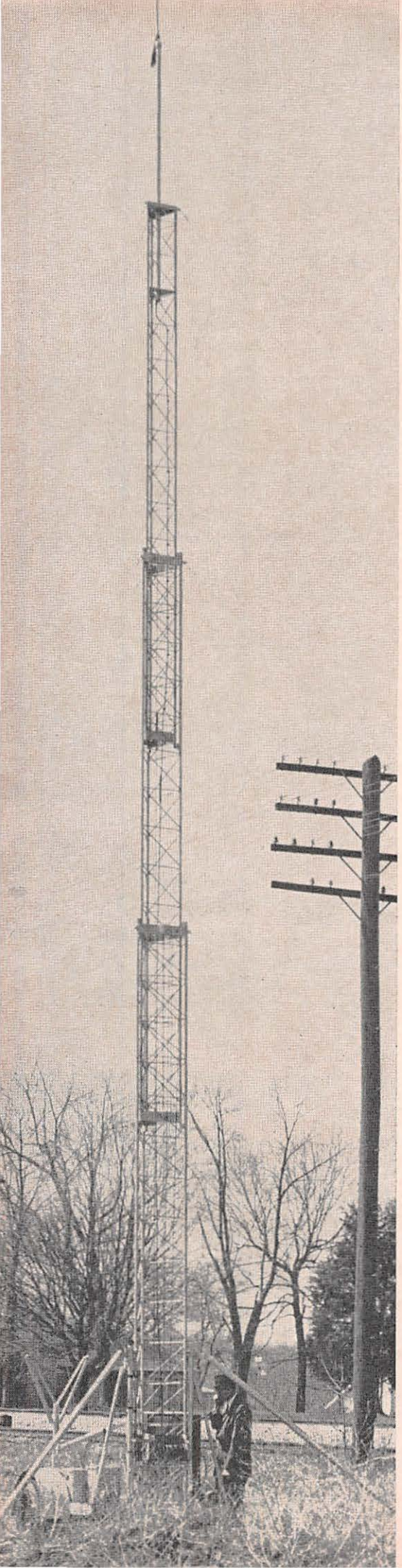
Northern Pacific had only 19 communications poles leveled at the Northtown yard due to a tornado. On the signal side, A. J. Hendry, signal engineer, reported that approximately one-half mile of pole line was destroyed along the main track extending from North Minneapolis westward. He said that "damage occurred as one of the cyclones descended almost directly upon the pole line in the village of Fridley, Minn., just beyond the entrance to our Northtown yard. Considerable overtime labor was used to install temporary circuits and the line is now being restored to permanent condition. The cost will probably be of the order of $10,000 for signal facilities only."

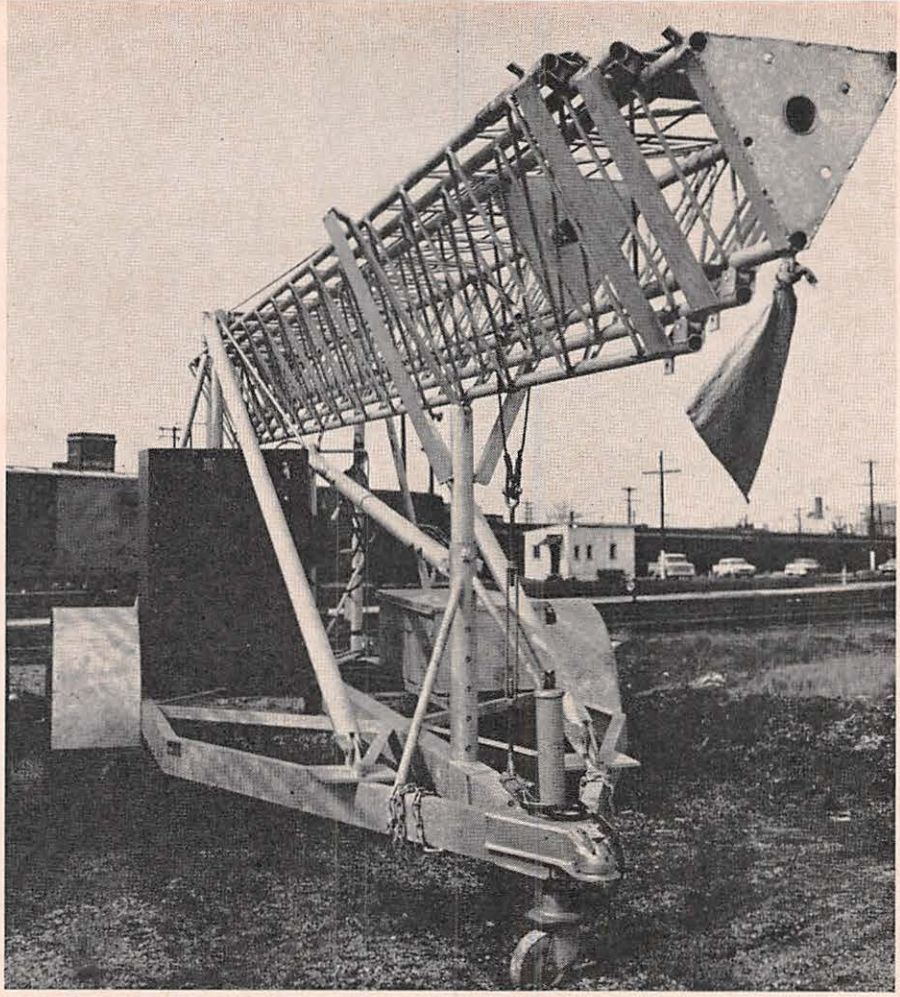
Nature sure has not been kind to us so far this year, is one signal engineer's comment. He, along with many colleagues, hopes it will be a long, peaceful summer. "We need time to dry out," echoes another signalman. By late summer, operations should be normal. **RS&C**

Rock Island line near Nahant, Ia., shows how pole lines may escape severe damage due to high water, unless there is a washout.



This pole line did not escape high flood waters.





L&N has mobile repeater

By R. E. Dove
Associate Editor
Railway Track & Structures

Foremen of track gangs and bridge gangs on the Louisville & Nashville are using a mobile radio repeater as a new means of increasing their production. Some gangs have been able to obtain from 10 minutes to a half hour more working time for each train passing through their work sites.

The mobile radio repeater, which is produced by Motorola Communications & Electronics, Inc., increases the distance over which a foreman can communicate with the engineman of an approaching train. Through such extended coverage the engineman advises the foreman of his location. With this information the foreman can determine more closely the time he must stop his work and get his machines in the clear so as not to delay the train.

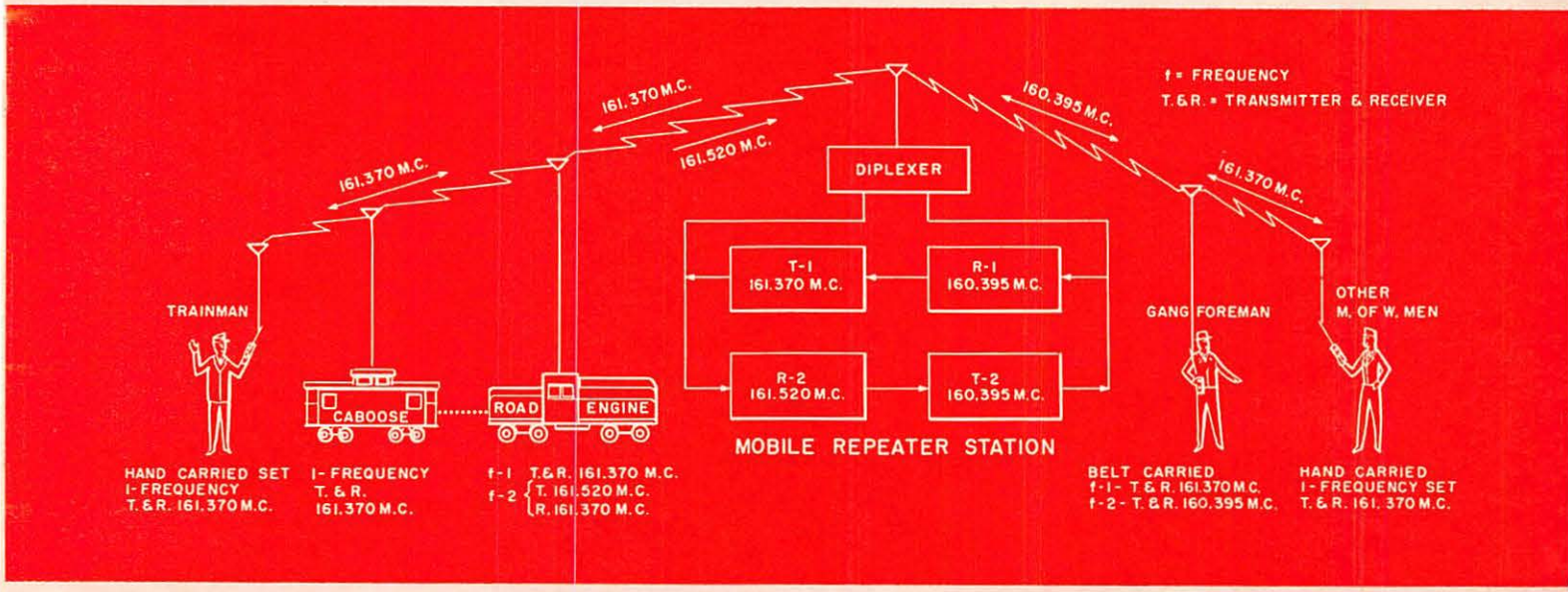
The foreman and engineman remain in radio contact. Should the train be delayed, the foreman can be told of this, thus enabling him to gain more production time. Also, should the track remain obstructed, or a piece of track equipment be derailed, the engineer can be advised before reaching the designated mile-post. In any event, he must stop at the designated mile-post unless he has been told by the foreman that the track is clear.

From the operating man's viewpoint, the use of radio flagging will mean less delays and stopping of trains, explained M. R. Williams, engineer communications-system. Also train crews can be quickly notified of sticking brakes, dragging rigging, hot boxes, protruding lading, broken wheels and defective trucks whenever such conditions are observed by the M/W gangs.

From the track man's point of view, said J. K. Gloster, the L&N's engineer maintenance of way, redio flagging not only releases the two men ordinarily used for gang protection for more productive work in the gang, but, more important, it increases the time that machines

TELESCOPING ANTENNA TOWER
When extended, supporting tower for radio repeater antenna reaches 50 ft into the air. Tower is of three sections which contract to about 20 ft in length. It weighs about 350 lb and fits on a two-wheeled trailer for hauling.

MOBILE RADIO REPEATER
Mobile repeater station relays radio communications between train crews and maintenance of way men working along the right-of-way. Diplexer permits multifrequency operation on one antenna. Radio is housed in base of tower.


f = FREQUENCY
T. & R. = TRANSMITTER & RECEIVER
161.370 M.C.
161.520 M.C.
160.395 M.C.
161.370 M.C.
161.370 M.C.
DIPLEXER
T-1 161.370 M.C.
R-1 160.395 M.C.
R-2 161.520 M.C.
T-2 160.395 M.C.
MOBILE REPEATER STATION
TRAINMAN
CABOOSE
ROAD ENGINE
GANG FOREMAN
OTHER M. OF W. MEN
HAND CARRIED SET 1-FREQUENCY T. & R. 161.370 M.C.
1-FREQUENCY T. & R. 161.370 M.C.
f-1 T. & R. 161.370 M.C.
f-2 T. 161.520 M.C. R. 161.370 M.C.
BELT CARRIED f-1 - T. & R. 161.370 M.C. f-2 - T. & R. 160.395 M.C.
HAND CARRIED 1-FREQUENCY SET T. & R. 161.370 M.C.

station to extend radio coverage

and men can occupy the track. The road reasons that, if a 20-man gang can gain only 10 minutes more on-track time for each passing train, 3⅓ productive man-hours are realized. When multiplied by the 8 to 10 trains passing through a gang each working day, 30 or more man-hours are gained.

The radio repeaters can be effective in preventing a serious bridge burn-out and possible accident. For example, should an engineman notice a fire on a bridge, he can notify a track gang by radio. As a result the fire may be extinguished while it is still in its early stage. Train crews can also avert accidents by radioing track gangs whenever large joint gaps or broken rails are encountered.

The use of radio for communication between M/W foremen and engineers of trains is not new on the L&N. The foremen have had hand-carried radio sets for some time. But, due largely to the rough terrain through which the L&N operates, the range of these sets was limited to about one to two miles at most locations.

This did not permit enough advance notice for a foreman to clear the track of his equipment without delaying trains. This brought about the need for the foreman to keep in touch with the dispatcher by telephone so as to know when he had to clear the track to avoid stopping the approaching train. However, this practice made inroads in the working time and did not give maximum benefits from the use of radios.

More powerful sets mounted on a truck were used by some gangs. Although this proved to be better, it had the disadvantage of tying the truck to the gang. This led to the idea of using mobile repeaters, which avoided the need for additional trucks when the use of radio was expanded for flagging purposes.

The radio repeater extends the range to a minimum of 10 miles and, under favorable conditions, up to 30 miles. The repeater is mounted on a two-wheel trailer so it can be hauled by a foreman's truck and

DIPLEXER UNIT permits multi-frequency operation on a single antenna.

temporarily set at a point where reception is most favorable.

About 30 minutes is required to set up the mobile radio repeater station by the man placing it. The single antenna is mounted on top of a three-section telescoping Rohn tower that is raised from its retracted horizontal position on the carrier to the vertical by a hand-operated winch. When in its vertical extended position, the antenna is at a height of 50 ft. Two tubular outrigger arms and three guys, extending from the upper two sections to screw-type ground anchors, stabilize the tower in its raised position. The unit requires no attendance and the equipment housing is kept closed with a switch padlock. Where practical, it is left in place several days.

The relay equipment consists of two Motorola Motrac railroad battery-powered two-way repeaters (model U43-HHT-1100E-SP2). The batteries are recharged at night by connecting a 12-volt charger to a portable generator.

L&N practice is for the gang foreman to secure authority from his division engineer for radio flagging. When approved, he must contact the dispatcher before 6:00 pm of the day preceding the use of radio flagging and give the information necessary to issue a Form "W" train order. Form "W", which is in addition to the regular train orders given train crews, stipulates the date and hours that it will be in effect. It also orders northward trains to approach a Conditional Stop track sign at a certain mile-post and southward trains at another mile-post and be prepared to stop. Trains cannot pass the designated points until notified by the gang foreman by radio or in person that the track is clear.

Each form "W" order is valid only for the day and time specified and cannot be continued from day to day. A new order must be issued for each day. Should the gang foreman work longer than the hours designated, he must then flag by hand according to the standard book of rules.

On the day that the Form "W" train order goes into effect, the gang foreman must plant a Conditional Stop track sign at each of the designated mile-posts on the engineer's side. He must also erect a Reduce Speed sign at least 1½ miles (7,920 ft) in advance of the the location of the Conditional Stop sign. He cannot obstruct the track until these signs are erected.

M/W MEN USE RADIO
Foreman radios his m/w gang or approaching train crews.

The Reduce Speed sign is a diamond-shaped board mounted on a metal staff and is painted yellow with horizontal white stripes. The Conditional Stop sign is a rectangular board painted red with diagonal white stripes. Trains passing the Reduce Speed sign must immediately reduce speed and be prepared to stop at the Conditional Stop sign unless advised in advance by the foreman on radio that the track is clear.

The gang foreman has a belt-carried Handie-Talkie radio set that has two frequencies, both of which permit him to transmit and receive. His set is normally set for 161.370 mc as it is the same as that used on the Handie-Talkie sets furnished to the operators of the larger machines in his gang. The frequency enables the foreman to coordinate all activities of the gang, which may be spread over a distance of one or two miles.

The other frequency of his set is 160.395 mc and is the one he uses, by merely flipping a switch, to talk with engineers of approaching trains. The 160.395-mc frequency is received by the mobile repeater and by means of a diplexer is converted and transmitted on a frequency of 161.370 mc. The radio set on the locomotive receives on this frequency as it is the same as the end-to-end radio sets of the train crew. Consequently, the engineer can always hear the call of the gang foreman if he is within the required broadcasting range.

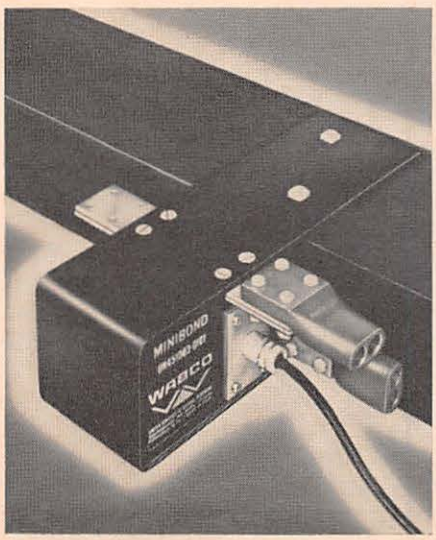
To converse with the gang foreman, however, the engineer must throw a switch on his set which still lets him receive on the 161.370-mc frequency but transmits on a frequency of 161.520 mc. The mobile repeater receives this frequency and converts and transmits it to 160.395 mc, the same as that of the gang forman. If the repeater should lose its power, the foreman could still converse with the engineer when the train comes within the power range of his set. The arrangement of frequencies used makes it possible to receive and transmit signals over a single antenna at the repeater station.

The foreman usually contacts the dispatcher several times a day to keep informed of trains than can be expected during his work hours. This he does through wayside telephones that are available about every mile.

The L&N put its first mobile repeater into use on December 14, 1964, on its Cincinnati division. It is now acquiring additional units and intends to have a total of 24 mobile trailer-type repeaters and 5 of the skid type. The latter are for use by bridge gangs which work at the same location for a considerable period.

As the repeater units are acquired, they will be assigned to tie and surfacing gangs, smoothing gangs, a rail gang and bridge gangs, where necessary. The sets will be maintained by communications forces at the road's radio shops at strategic points over the system. Spare sets will also be acquired so they can be plugged in to replace failed sets. **RS&C**

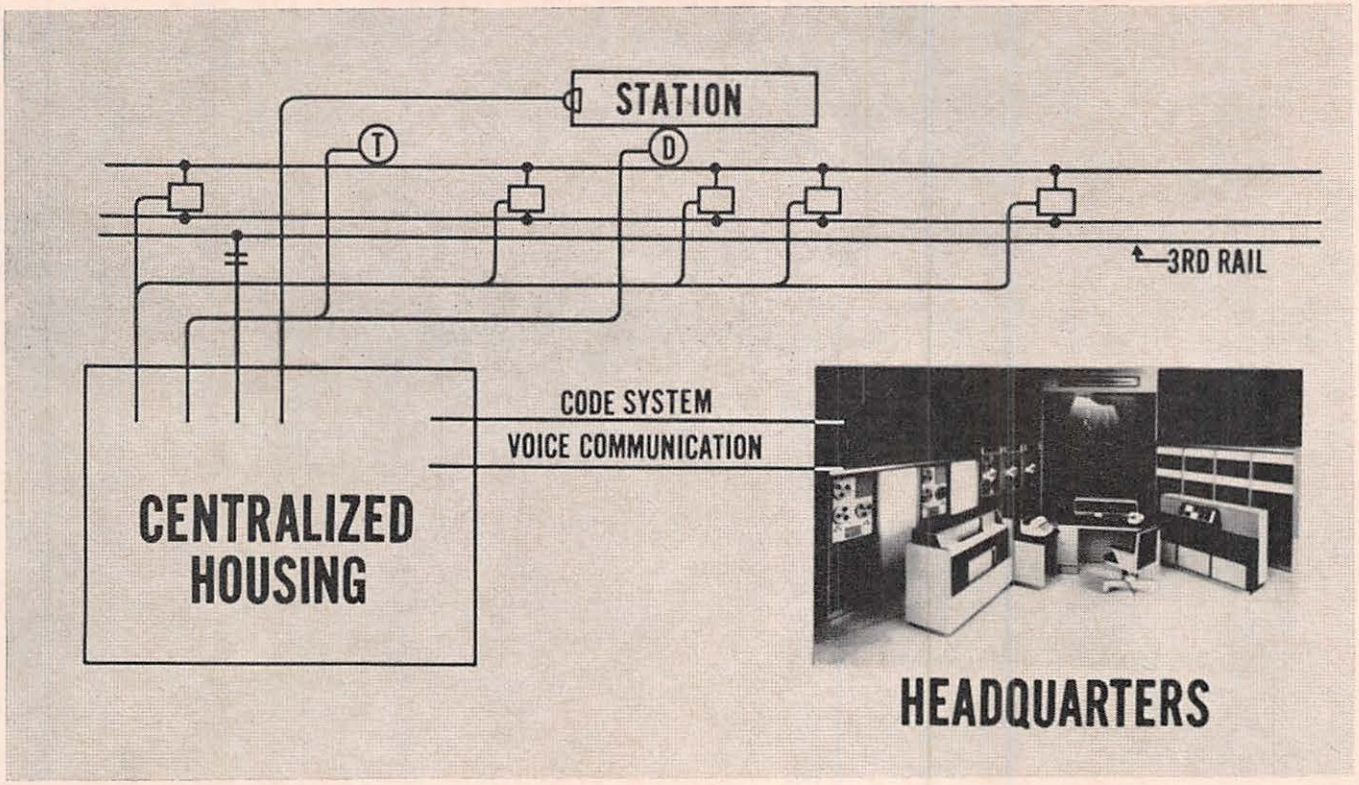
New miniature impedance bond could be mounted between the rails in an existing subway.



AFO circuits can be used in subways

The use of audio frequency track circuits can materially reduce installation and maintenance costs of the signal and control systems used in rapid transit networks. Such AFO track circuits will be used for the Expo Express (without wayside signals) serving the 1967 Montreal World Exposition. Similar equipment will be put forward by Union Switch & Signal division of WABCO for the test track of the San Francisco Bay Area Rapid Transit District at Concord, Calif.

In a talk to a recent meeting of the American Transit Association, Crawford E. Staples, consulting engineer, US&S, described new de-



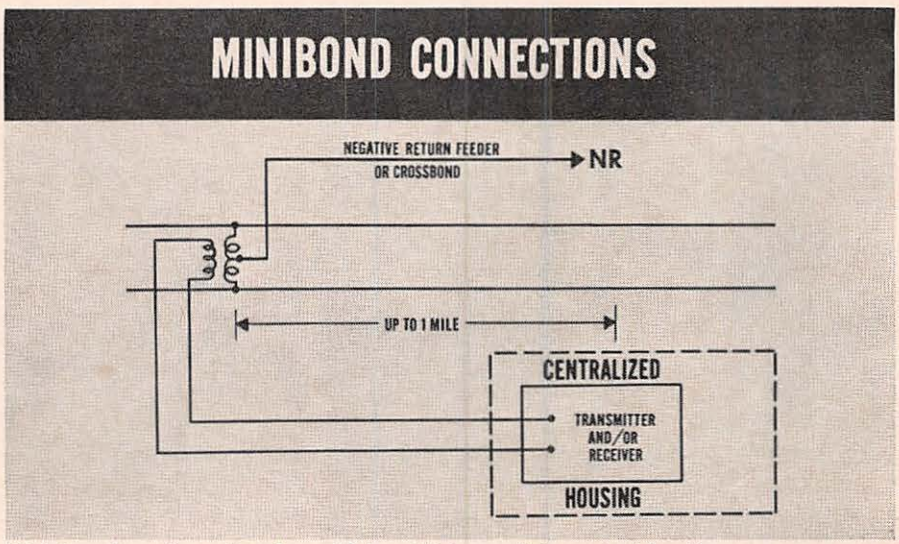
Communications network using high-speed coding system can tie wayside equipment to a headquarters computer.

velopments in AFO circuits for transit signaling.

A new audio frequency track circuit, cab signaling, and speed control system eliminates, between stations or interlockings, all of those items which require the most maintenance or the most difficult installation—insulated rail joints, wayside signals, trip stops, and instrument cases. This system permits centralized housing of control equipment at stations or interlockings, convenient to maintain and applicable to centralized traffic control.

The heart of the new system is the Minibond, a small impedance bond designed for use with audio frequency track circuits. Though weighing only 60 lb, and one-tenth the size of a standard bond, it is capable of carrying 2,000 amp per rail continuously. It may be mounted on the center or end of a crosstie, or may be inverted to mount on concrete. It is encapsulated and watertight.

A single Minibond and its connections are all that is required at each intermediate control location. The center-tap on the track winding is used for cross-bonding or connected to the structure, making use of all rails for propulsion return. A pair of wires to the nearest centralized housing handles all controls. Centralized housings may be over two miles apart. This arrangement minimizes maintenance and fosters use of track maintenance equipment.



Miniature impedance bond would be at intermediate control locations.

The audio frequency track circuit consists of the rails between two Minibonds, a transmitter connected to one Minibond, and a receiver energizing a track relay connected to the other Minibond. Because of the relatively high impedance of the rails to audio frequencies of 2 to 6 kc, no insulated rail joints are required to limit the track circuit. The track circuit will not be shunted when a train is more than a few feet outside of the Minibond locations. Where ballast is well maintained, audio frequency track circuits may be over 2,000 ft in length, and still provide broken rail detection, adequate shunting, and protection from interference.

One transmitter location may feed two track circuits, one in each direction, at the same audio frequency. Otherwise, different audio frequencies must be used in adjoining track circuits and on parallel tracks to prevent mutual interference. There is a small overlap area at each Minibond, where a train will shunt adjoining circuits.

The same principle is used for cab signaling. However, since the cab signal must operate in any track circuit, the same audio carrier frequency, about 1 kc, is superimposed on the rails throughout the system, and is coded or modulated at various rates to provide various commands, when required and permitted. Two cab signal audio frequency carriers may be coded alternately or independently to increase the number of commands.

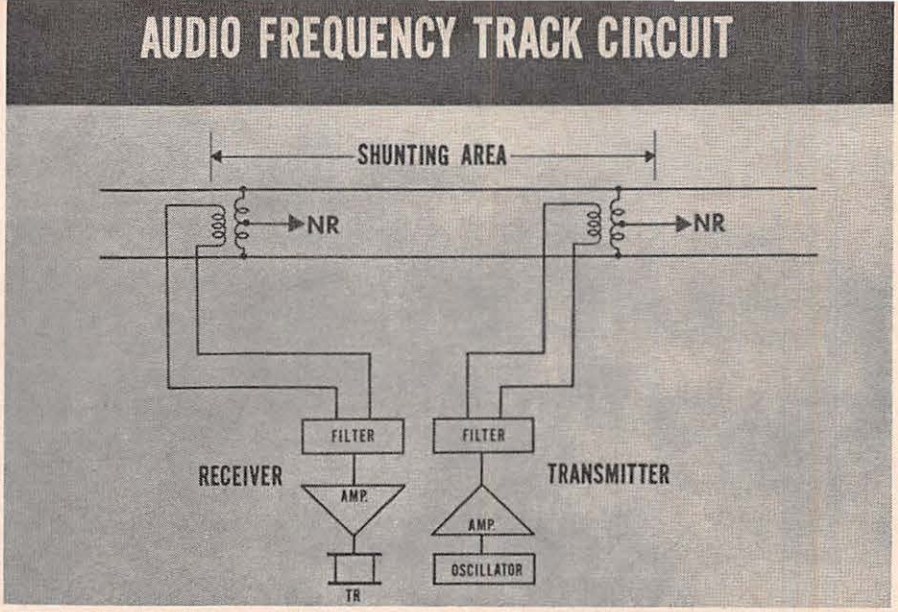
When a train occupies a track circuit, the cab signal coded carrier is applied to the Minibond at the exit end if traffic conditions permit. The resultant current flowing through the axles of the train induces a voltage in the train carried receivers mounted over the rails ahead of the front axle.

The received signal is filtered, amplified, and decoded by equipment on the train to obtain suitable outputs, which may be used to provide cab signaling. The same outputs, in conjunction with speed-sensing devices provides speed control.

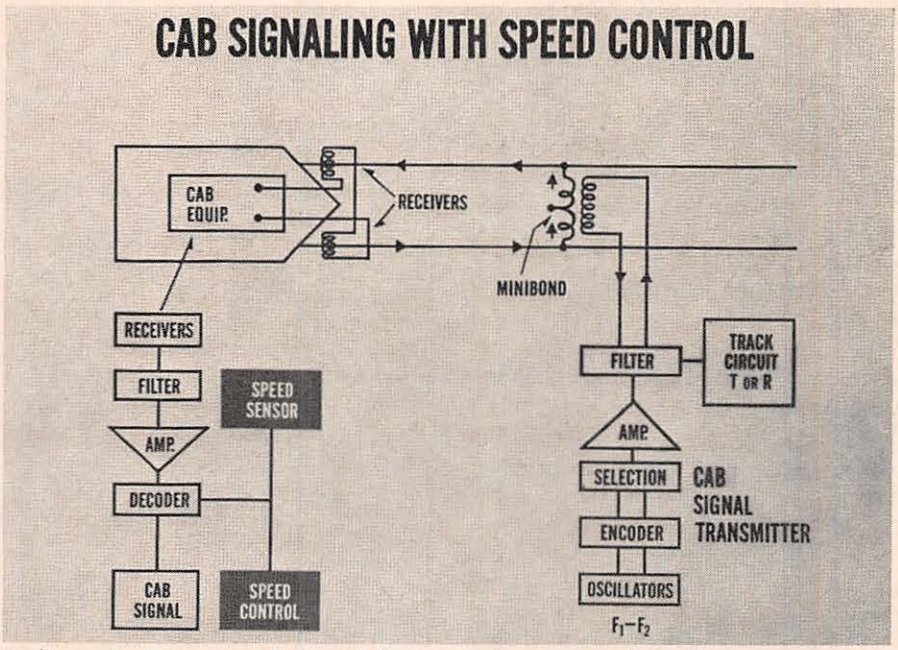
This is a major step to automatic train operation. A train-carried station stop profile, in conjunction with wayside triggers, and a velocity control programer, provides for automatic station stops. Other controls provide for station stop time, selective door opening and closing, train reversal, etc.

The entire system can be tied together by communication networks, employing high speed code systems, between the centralized housings and headquarters, where computers can be used to control the system. Voice communication can be selectively superimposed to provide public announcements or private two-way communication between train attendants and dispatchers.

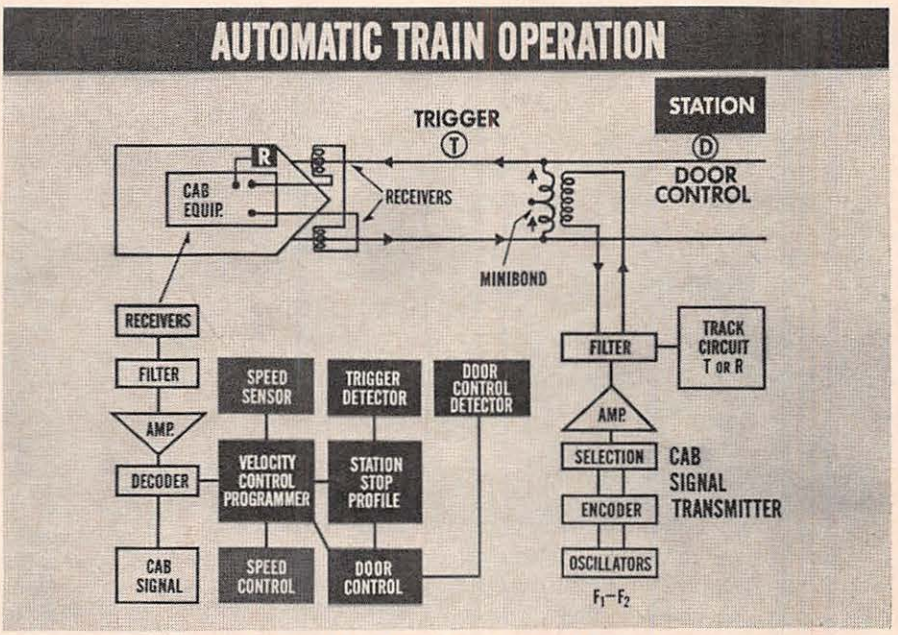
Some of the major advantages of the basic audio frequency track circuit and speed control system are: (1) Reduction in installation and maintenance costs, (2) Improvement in propulsion negative return, (3) Reduction of trackside equipment, (4) Applicability to welded rail, (5) Reduction of noise, (6) Simplification of track maintenance, (7) Centralized housing, (8) Expandibility to centralized system control; and (9) Expandibility to automatic train operation. **RS&C**



AFO circuit may be over 2,000 ft long, and needs no insulated joints.



Audio carrier frequency of about 1 kc is superimposed on the rails.



Cab signaling with speed control is a basic component of ATO.

WHAT'S THE ANSWER?

Signal Lighting

Q. In recent years several railroads have changed from approach lighting to continuous lighting of signals in automatic block and CTC territories. What is the practice on your railroad? Why?

A. Recent CTC installations on the Atlantic Coast Line use approach or full block lighting for home and intermediate signals because:

(1) Our instructions provide for replacement of continuously lighted signal lamps every 9½ months, whereas approach lighted lamps are replaced after not more than 24 months or when observation by maintenance forces indicates a possible shorter lamp life. Approach lighting holds replacement lamp cost to a minimum.

(2) A normal reduction in power results, in addition to which longer operating periods, on standby battery, can be anticipated when power is interrupted due to storms.

R. M. Rosensteel, Signal Engineer, Atlantic Coast Line, Jacksonville, Fla.

Signal Power

Q. Where signal departments transmit power on a joint pole line, what measures are taken to prevent inductive interference with the communications circuits?

A. On joint power and communication pole line we take the following measures to prevent interference with the communications circuits:

(1) We transmit power at 4800 volts, 60 cycles, three phase, ungrounded.

(2) Although most of the load taps are single-phase, the taps are staggered so that loads on the three phases will be reasonably well balanced.

(3) We try to keep the high tension line clear of faults. A leaking insulator or an arcing high tension switch contact will almost always put noise on communication circuits even though in many instances such faults would have no adverse effects on power distribution.

(4) All of our transmission lines have capacitors and we attempt to keep power factors close to 100%. The resulting minimum current causes a minimum of inductive interference. Although not related to interference, two valuable by-products of high power factor are good voltage regulation and reduction in power costs.

(5) All except local communication circuits are transposed for 30 kc or better. These transpositions provide good balance to power exposures even on pairs handling nothing higher than voice frequency.

We consider the joint operation to be entirely satisfactory. We are more vulnerable to power line faults but this is not altogether a disadvantage for it enables us to quickly discover and correct faults that might otherwise go unreported for some time.

J. M. Hesser, Assistant Manager Signals & Communications, Norfolk & Western, Roanoke, Va.

Questions

- How often do you make speed measurements in automatic retarder classification yards? Please describe your practices, involving where such measurements are taken—in relation to master and group retarders for example. Do your measurements include determination of coupling speeds on the class tracks?

- What test procedures have you set up for checking the operation of microwave equipment? Please describe, including types of test gear and how often tests are made?

- What factors, other than accessibility of highways, determine the choice of providing trucks instead of track motor cars for signal maintainers and communications linemen? Do you provide your men with both types of vehicles? Please describe your practices, including reasons for them.

- If you use rail lubricators in retarder yards, where do you locate them—ahead of the master retarder; between the master and group retarders; or below the group retarders? Please give reasons for the locations selected. Have you found car rollability to be satisfactory without the use of rail lubricators?

Send answers to these questions to the WA editor, Railway Signaling and Communications, 22 West Madison St., Chicago, Ill. 60602. Payment is made for all answers printed. Answers will be printed without names or railroad identification if desired, but all letters with answers must be signed.

R F Interference

Q. How do you reduce interference due to radiation from a radio transmitter during frequency checks and testing?

A. To-date we have not had a serious radiation problem while making frequency checks and testing at our various radio shops. In some of the older radio units the local oscillator in the receiver required a special harmonic suppression kit to keep from operating the squelch of a Fire Department installation, but this was not related to transmitter radiation.

As more assignments are made in given areas we may be required to incorporate either single or double screen room arrangements, but have not given consideration to them at this time.

F. B. Childs, Radio Engineer Northern Pacific, St. Paul, Minn.

"This is fun Charlie. Now you stand here, and I'll run the engine."

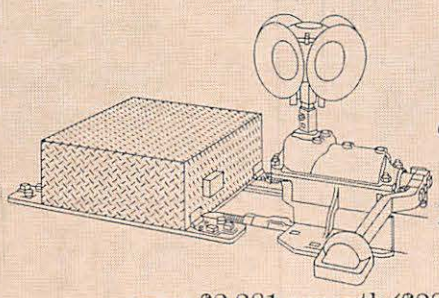
CONFIDENTIAL

Case history ...

Application: N.Y. Central, White Plains yard 8 hydraulic switch machines with #22 stands.

Submitted by: W. Kilrea

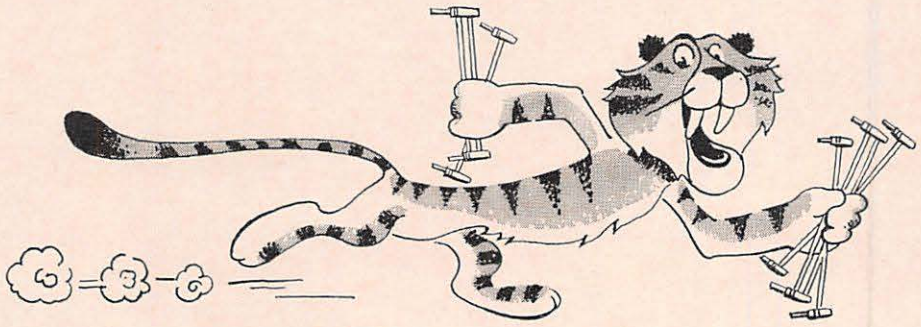
Confidentially, they're saving $2,281 a month.



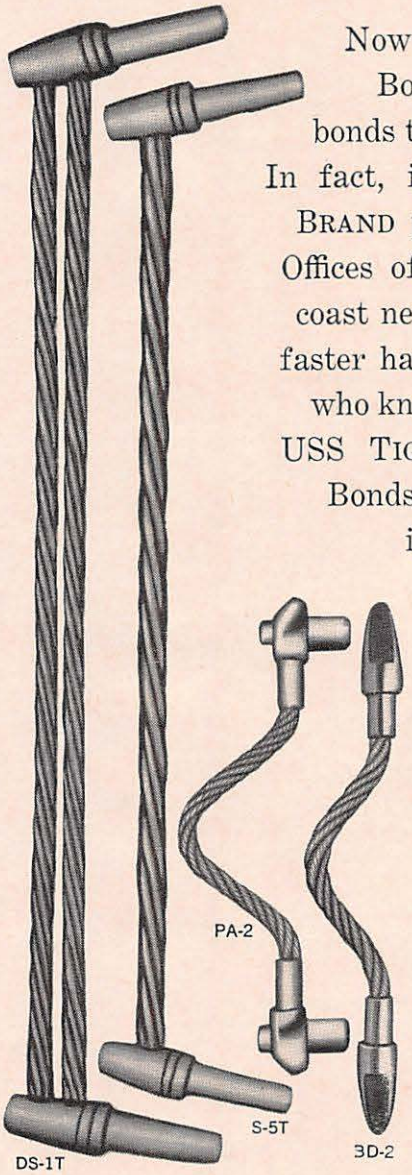
New York Central used to spend $27,375 a year to operate three switches to the car wash and five to the Diesel refueling area, in their White Plains yard. They installed eight of our Hydraulic Switch Machines with #22 Switch Stands. What happened? Payoff reached in just eleven months. After that, the Central saves $2,281 a month ($285 per machine). Tell your Brake Shoe man you want to see the many features of this machine for yourself. Or contact:

Abex
AMERICAN BRAKE SHOE

Railroad Products Division, 530 FIFTH AVENUE, NEW YORK, NEW YORK 10036



Now—you can order USS Tigerweld Signal Bonds from 29 USS District Sales Offices coast to coast



Now you can order USS TIGERWELD Signal Bonds and all other types of USS rail bonds through *any* USS District Sales Office. In fact, information on *all* our USS TIGER BRAND products is available from the Sales Offices of United States Steel. This coast-to-coast network of 29 offices will give you even faster handling of signal bond orders by men who know their products.

USS TIGERWELD and USS TIGEREX Signal Bonds are designed to meet all your signaling requirements. USS TIGEREX Bonds, for instance, can be installed without any special welding skill. Just clamp the bond in position on the rail, pour in the powder, ignite the mixture and the exothermic reaction welds the bond to the rail. For additional information, write or call any of the offices listed at right, or write United States Steel, Room 8104, 525 William Penn Place, Pittsburgh, Pa. 15230. USS, TIGERWELD and TIGEREX are registered trademarks.

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Buffalo, New York
(Area Code 716) 856-3350

Charlotte, North Carolina
(Area Code 704) 372-2310

Chicago, Illinois
(Area Code 312) 236-9200

Cincinnati, Ohio
(Area Code 513) 421-4460

Cleveland, Ohio
(Area Code 216) 861-2000

Dallas, Texas
(Area Code 214) 748-0471

Denver, Colorado
(Area Code 303) 266-3001

Detroit, Michigan
(Area Code 313) 872-8350

Birmingham (Fairfield), Alabama
(Area Code 205) 783-8011

Houston, Texas
(Area Code 713) 225-6491

Indianapolis, Indiana
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(Area Code 213) 585-1171

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Milwaukee, Wisconsin
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New Orleans, Louisiana
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(Area Code 212) 558-4444

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(Area Code 503) 222-9534

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St. Paul, Minnesota
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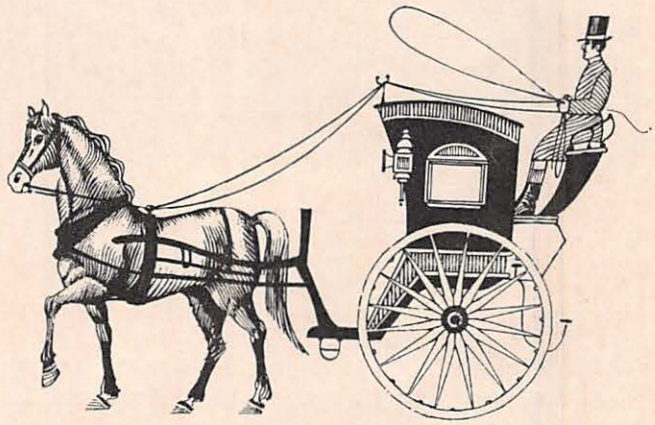
USS United States Steel: where the big idea is innovation



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THINK AHEAD...THE NEW KLEINSCHMIDT *321 ADS* CONVERTS TAPE TO HARD COPY AT 400 WORDS PER MINUTE!...TODAY

Think of tape conversion four times faster than you may be getting now. Think of less tape backup. Think of the Kleinschmidt™ 321™ ADS. Whether it's used "on line" or "off line," the 321 ADS gives you complete and reliable facilities for tape preparation, tape duplication and hard-copy print-out. For further information on the efficiency of the 321 ADS and other Kleinschmidt Electronic Data Communications equipment, write: KLEINSCHMIDT, Division of SCM Corporation, Lake Cook Road, Deerfield, Illinois.

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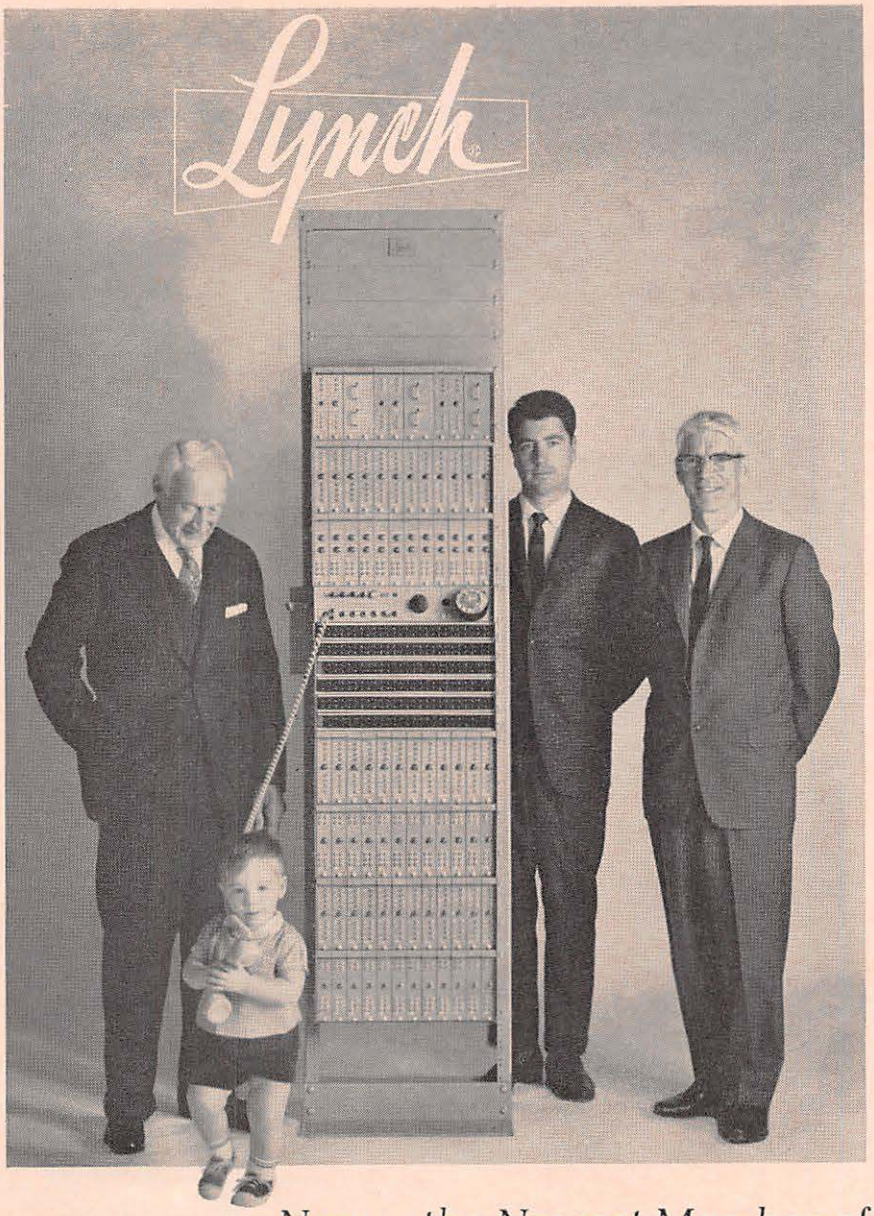

Now... the Newest Member of the Lynch Multiplex Family steps forward to make your job easier!

This fourth generation of the Lynch Microwave Multiplex family was designed to make your job easier by providing more channels in less space, simplified ordering procedure and installation requirements with flexible rack profiles . . . plus optimum transmission quality at a competitive price. System is available for 1 to 612 channels with 12 channels below 60 kc; optional allocations for CCITT, "L" Multiplex compatibility or economical channel "drop and insert" applications; Inband or Outband Signaling for E & M, AC Ringdown or One-Way Loop Dial; 4W Terminating Sets with or without A & B Leads; Top of Bay Terminal Blocks with Interconnecting Cables; Individual Channel or Master Frequency Oscillators; Optional Wideband 8 kc Channels for Data Application; and a Telephone Terminating Test Panel to provide talking and signaling facilities at carrier and drop terminations. Make your job easier by asking for the Lynch B910B "Transistorized" Microwave Multiplex sales bulletin.

LYNCH COMMUNICATION SYSTEMS INC.

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NEWS BRIEFS

(Continued from page 10)

ditions may prescribe."

• BALTIMORE & OHIO has received ICC approval to install a traffic control system between Sherwood, Ohio and Indo, Ind., about 17 miles in connection with removal of second main track between Sherwood and Hicksville, Ohio. Control will be from a machine at Akron, Ohio.

• BOSTON & MAINE has ordered a type E retarder from General Railway Signal Co., for installation at Mechanicville, N.Y., yard.

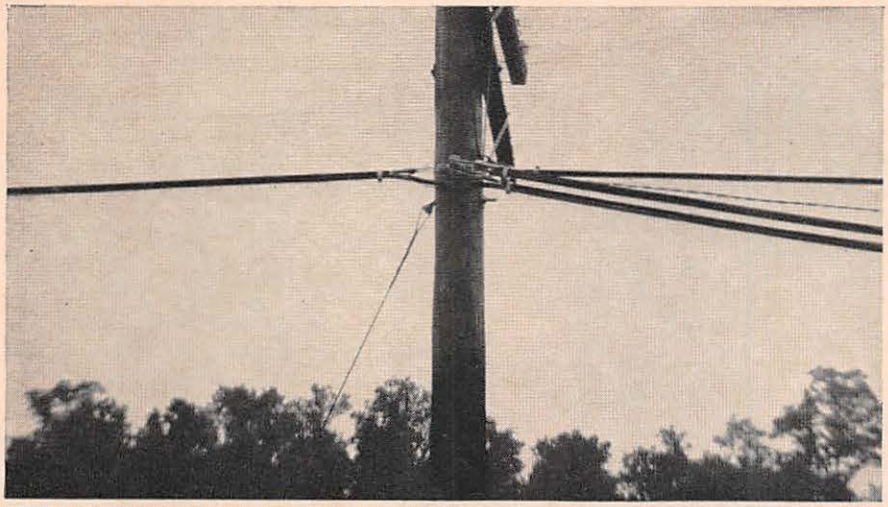
• CHICAGO & EASTERN ILLINOIS: General Railway Signal Co., is supplying 8 sets of intermittent inductive train control equipment for EMD locomotives for use by the railroad.

• MILWAUKEE ROAD: Examiner Robert R. Boyd, ICC, has issued an order granting the railroad relief from the requirements of section 136.587 of the RS&I to the effect that it be permitted to operate locomotives of its train No. 12 which originates at Watertown, Wis., and its trains Nos. 168-68-681 and 186-86-861, both of which originate at Savanna, Ill., without making a test of the automatic cab signal apparatus over track elements or test circuits on departure of such locomotives from their initial terminal. In the examiner's report, the fact is brought out that the locomotive equipment is tested prior to entering cab signal territory.

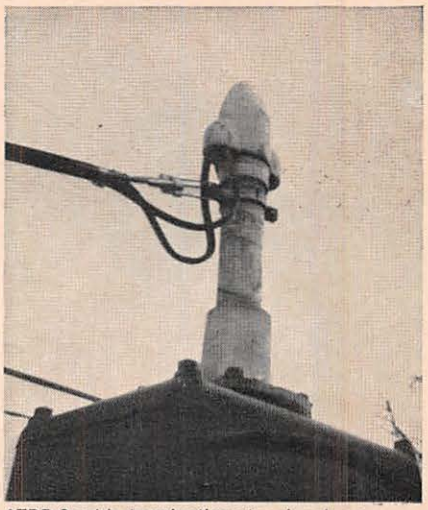
• CHICAGO TRANSIT AUTHORITY will soon be taking bids for the purchase of cab signaling and speed control equipment to be installed on the Lake street line. Estimated cost of the equipment is $700,000. Installation is to be performed by CTA personnel. This cab signaling and speed control system will utilize audio frequency track circuits.

• COMMUNICATION and signal material purchased by Class I railroads in 1964 totaled $48,361,000, down $2,837,000 from 1963. These figures were recently announced by the AAR.

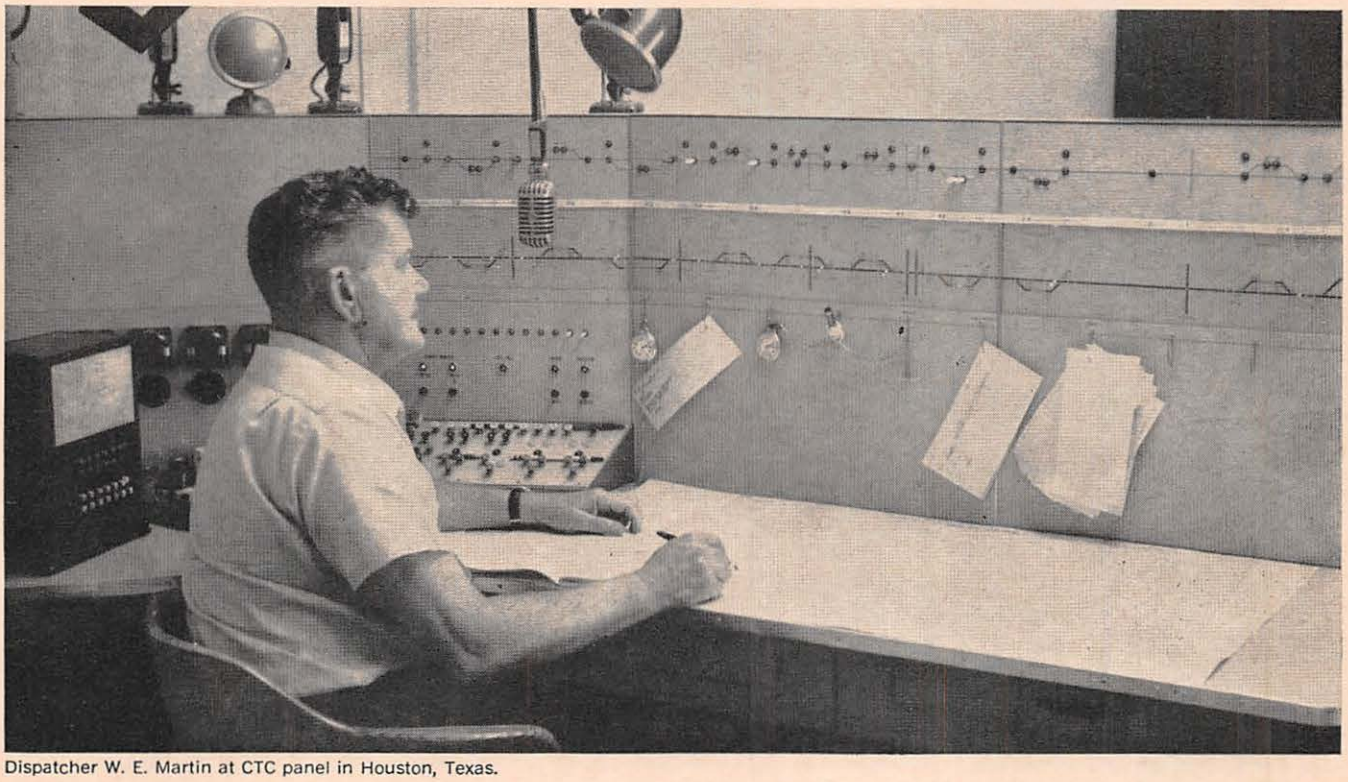
(Please turn to page 30)



ATRR-8 cable leaving terminal pole at a signal location.



ATRR-8 cable terminating at a signal case.



Dispatcher W. E. Martin at CTC panel in Houston, Texas.

106 Miles of ATRR cable help Missouri Pacific trains go faster!

Between Kinder and Anchorage, La., Missouri Pacific freight trains now travel at 60 mph—instead of 49. Passenger trains breeze along at 79 mph—instead of 59. And more economically, too. That's because 106 miles of Anaconda ATRR-8 cable now puts the switches and signals on this stretch of single track under the direct control of Mopac's Centralized Traffic Control dispatcher at Houston.

This is quite an unusual application for our 300 volt high reliability ATRR-8 Communication Cable. But it's the right cable for the job. In addition to signal circuits, this cable provides a voice circuit for maintainers and a fall back dispatcher circuit. 3 pair and 6 pair #14 AWG ATRR-8 cables were installed between Kinder and Anchorage. And every foot of cable was water-tested according to Anaconda ATRR cable specifications.

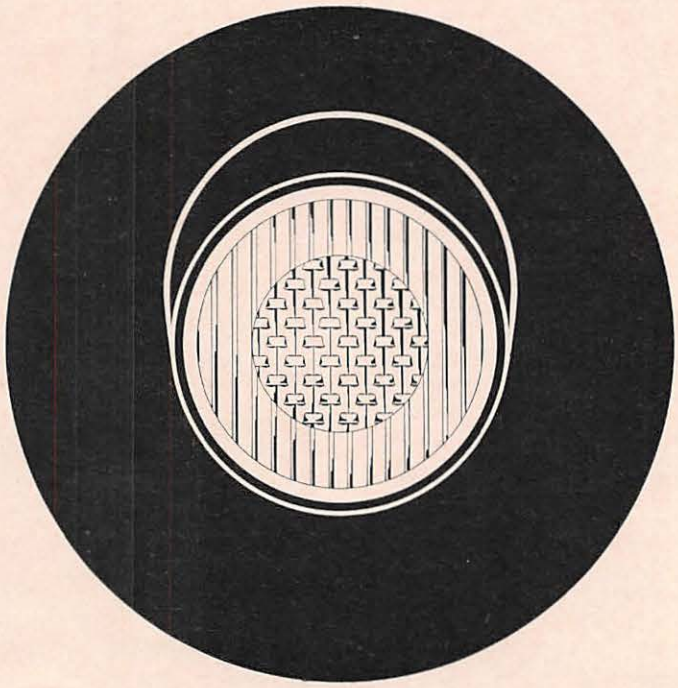
For full details on the application of ATRR cables in railroad and transit systems, call your Anaconda man. Or write Anaconda Wire and Cable Company, 605 Third Avenue, New York, N. Y. 10016.

65235

ASK THE MAN FROM

ANACONDA®

ABOUT ATRR CABLES



"Signal intensity increased three times through the combined efforts of Union Switch and Kopp"

William Lockhart, Senior Engineer, Light Signal Department of Union Switch and Signal, developed the ideal light distribution curve for this roundel. He then asked Kopp to *"design a roundel that would increase signal intensity 3 times, range 2½ times and be ideal for high-speed highways"*. A plus feature, this signal uses the same low cost 18-watt lamp. It can be interchanged with all standard highway x-ing roundels.

UNUSUAL RELIABILITY AND SERVICE . . . THE USUAL AT KOPP GLASS

KOPP GLASS INC. SWISSVALE, PENNSYLVANIA

KOPP GLASS

NEWS BRIEFS

(Continued from page 28)

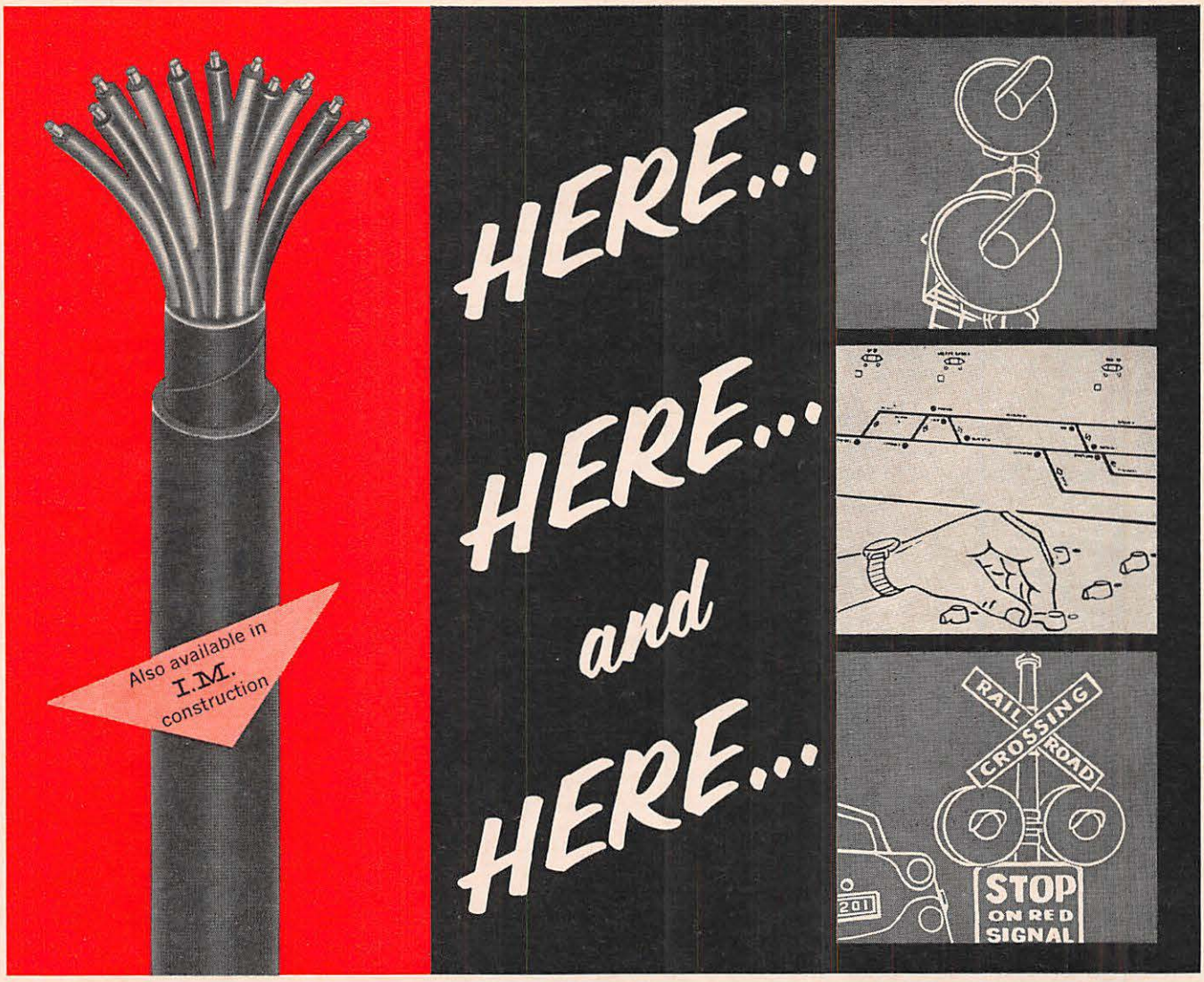
• DENVER & RIO GRANDE WESTERN has been granted relief from the requirements of section 136.602 of Ex Parte 171 RS&I to the extent that it be permitted to install dragging and/or derailed equipment detectors and their associated indicators without being arranged to operate in conjunction with automatic block signals. The railroad will install these detectors at 19 locations. The road in its application stated that the primary intent is for the observance by the rear trainman of the associated indicator. He will immediately stop the train if an actuation of the detector is indicated. If these detectors were interconnected with the signal system, the train, in some instances, would have to travel six miles or more before it encountered a stop signal.

• MICROWAVE: A Joint Technical Advisory Group study of the reliability and related design parameter of microwave systems, and the resultant impact on efficient use of the spectrum, states that the government should sponsor a measurement program "to determine the relative merits of frequency and space diversity and the physical and climatic conditions under which each proves to be superior, in terms of impact on reliability and spectrum utilization."

As reported by *Telecommunications Reports*, JTAC pointed out that "There is no doubt that a frequency diversity system is less expensive than a space diversity system. Since the cost of service is a consideration, it is appropriate that petitions for frequency diversity be approved by the FCC for locations where spectrum crowding does not exist and is not likely to exist during a reasonable operating lifetime.

"However, in locations where spectrum crowding exists or is likely to exist, there is a three-way conflict among economy per circuit, number of circuits, and circuit reliability. The FCC should seek to relieve this conflict in the public interest. To do so, it requires quantitative data on the performance of the various diversity options. There-

(Please turn to page 32)



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Combines the Dependability you need with the Economy you want!

Superior Control Cable provides maximum performance at lower cost because it's quality engineered and designed.

Aerial and duct types; I. M. (Integrated Messenger) self-supporting aerial types; direct burial types, in three different series.

TC-19 SERIES Polyethylene Insulated Conductors, Polyvinyl Chloride Jacket

TC-20 SERIES Polyethylene Insulated Conductors and Jacket

TC-21 SERIES Polyvinyl Chloride Insulated Conductors and Jacket

All three series available in 2 through 33 conductors, 12, 14 and 16 AWG.

NEW Control Cable Catalog No. 310 now available.

For detailed information and prices, write

SUPERIOR CABLE

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Superior Cable Corporation • Hickory, North Carolina

NEWS BRIEFS

(Continued from page 30)

fore, it is strongly recommended that a data collection effort be undertaken."

• NEW YORK CENTRAL has ordered 4 hotbox detectors from General Railway Signal Co., for installation at Mungen and Peoria, Ohio, Erie, Pa., and Chelsea, Mich.

NYC has ordered 55 sets of approach overlay shunt track circuit equipment from GRS to provide electronic control of highway crossing protection and of switch locking in continuous welded rail territories.

NYC has received ICC approval to install a traffic control system on single track between Dunkirk and Dunbridge, Ohio, about 46 miles.

• PENNSYLVANIA has ordered 64 sets of approach overlay track circuit equipment and 8 sets of series overlay track circuit equipment from General Railway Signal Co. Approach overlay track circuits provide, without insulated joints, track circuit control of highway crossing protection equipment. The series overlay track circuits provide, without insulated joints, control of electric switch locks.

• SOUTHERN will construct a $12 million automatic classification yard at Macon, Ga. A $1.3 million contract has been awarded to General Railway Signal Co., for installing a retarder system, including electronic equipment controlled by a digital computer.

FCC upheld a staff action which rejected SOU railway request to install a public air-ground outlet in its executive airplane. The Commission stated that the railroad's request is "no different from the type of need of other prospective subcribers who desire this same service." FCC said the railroad has not demonstrated a need to justify waiver of an FCC policy determination, and had showed no special circumstances for its need.

MEN WANTED

Signalmen wanted for work on Santa Fe Railroad in California on extensive highway crossing protection program. Must be qualified by practical experience in all classes of signal work. Give age and experience. **Box 6, Railway Signaling & Communications, 22 W. Madison St., Chicago, Ill. 60602.**

POSITION AVAILABLE

SIGNAL CIRCUIT DESIGNER ON NEW ENGLAND RAILROAD. GIVE DETAILS OF EXPERIENCE AND PAY EXPECTED TO
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RAILWAY SIGNALING and COMMUNICATIONS
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SALESMAN

Excellent opportunity for experienced salesman calling on southeastern railroads. Knowledge of signaling and communications preferred. Send resume and salary requirements to:
Box 125
RAILWAY SIGNALING and COMMUNICATIONS
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NEW YORK, N.Y. 10007

• TELPAK: FCC by a vote of 5 to 1 has turned down all pleas to reconsider its interim order of last December (RS&C Jan. 1965, page 22). The Telpak tariff will remain as it is until after Sept. 1, 1965. The interim order directed AT&T to file revised Telpak C and D rates on Sept. 1, and to file new tariffs unifying the present Telpak A and B rates and the existing private line schedules.

Railroad Personnel

• MILWAUKEE ROAD: **William R. Jensen,** assistant engineer signals, has retired. He began his railroad career as a signal helper in 1927, and two years later was promoted to signal maintainer at Northbrook, Ill. In 1944, Mr. Jensen was appointed estimating engineer at Seattle, Wash. Two years later, he was appointed signal inspector, and in 1947 promoted to supervisor of signals at Miles City, Mont. He was appointed supervisor signals and communications at Chicago in 1950. In 1956, Mr. Jensen was promoted to assistant engineer signals.

• SANTA FE: **L. Ralph Thomas,** superintendent of communications, system, at Chicago has been appointed general superintendent of communications and signals, succeeding **James A. Parkinson,** retired. **C. A. Crouch,** superintendent of communications, Los Angeles, succeeds Mr. Thomas as superintendent of communications, system, at Chicago. **M. D. Breeden,** communications engineer, system, Chicago is appointed acting superintendent of communications, Los Angeles. **J. A. McCulloch,** communications engineer, Topeka, appointed acting communications engineer, system, at Chicago. **M. D. Goddard,** assistant engineer communications, Los Angeles, appointed acting communications engineer at Topeka, Kan. **K. J. Levack,** communications equipment supervisor, at Chicago, appointed acting assistant engineer communications at Los Angeles.

Mr. Thomas was born in Odessa, Mo., on May 18, 1911. He began his railroad career as an apprentice telegraph operator at Needles, Calif., in 1928. He advanced through various positions, becoming communications equipment supervisor at

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L. R. Thomas
Santa Fe

C. A. Crouch
Santa Fe

Topeka, Kan., in 1939. Two years later he was appointed telegraph engineer at Chicago. In 1944, Mr. Thomas was promoted to system electronics engineer, and in 1957 he was appointed superintendent of communications, system at Chicago.

Mr. Crouch was born on May 21, 1916 at Topeka, Kan. A graduate of the University of Kansas with a bachelor of science degree in electrical engineering in 1939, he began his SFe career as a helper electrician in 1939. Two years later he was appointed telephone engineer at Chicago. In 1944, Mr. Crouch was appointed telegraph engineer. In 1952, he was promoted to assistant superintendent of communications at Los Angeles. In 1957, he was appointed superintendent of communications.

• SOO LINE: **F. K. Cramer,** senior electronics inspector, Milwaukee Road, has been appointed assistant to communications and signal engineer, with headquarters at Minneapolis, Minn.

Supply Trade News

• ANSONIA WIRE & CABLE CO.: **Jack H. Scheinman,** chief executive officer and senior vice-president, has been elected president. He joined the company in 1964 as vice-president, marketing.

• CARBON PRODUCTS DIVISION, Union Carbide Corp.: **M. W. Westland,** manager of electrical and mechanical products central division, has been appointed product manager for brush, battery and mechanical products, succeeding **R. D. Kennedy,** who is appointed electrode and metallurgical product marketing manager. **Noel P. Lindsay** has been appointed central division manager succeeding Mr. Westland.

(Please turn to page 34)

RS&C achieves highly favorable response in reader survey

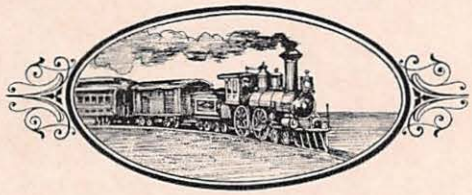
Four times a year, the editor of Railway Signaling & Communications takes a backward look over his shoulder with a view to determining how well his editorial product is being received.

700 cards are sent out to a cross-section of RS&C readers, listing articles and departments with checking spaces for "Very Good"—"Satisfactory" and "Not Interested".

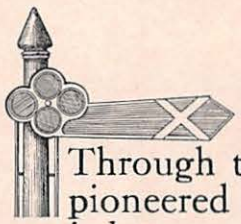
In this survey for the January, 1965 issue, 18% of the group replied. It is interesting to note that of 132 returns, "Very Good" or "Satisfactory" were the overwhelming choices for the various categories. The main feature, for instance, received a 98% favorable vote, "News Briefs" 97% and of particular interest to advertisers, "Product News" and "Supply Trade News" polled 95% and 89% respectively.

These high readership ratios are typical of studies made on RS&C, whether by our own organization or by outside sources. As the only technical railroad magazine serving the specialized signaling and communications field, RS&C is an unusually rewarding advertising buy. Ask your Railway Age Group salesman for complete information.

RAILWAY SIGNALING & COMMUNICATIONS



We've been working on the railroad



Through the years General Cable has pioneered many improvements in the varied types of wire and cable used by the railroads. GCC's track wire is protected by Aquaseal™ insulation, the premium synthetic rubber compound for greatly increased reliability and safety in signal operations. Aquaseal is superior in resistance to temperature extremes and can be used in dry, alternately wet and dry and continuously wet locations. It retains excellent electrical stability at all times, even when immersed in water and it exceeds in all respects the AAR Signal and Electrical Section Specifications for wire and cable. Contact your nearest General Cable sales office or write General Cable Corporation, 730 Third Avenue, New York, New York 10017.

GCC
GENERAL CABLE CORPORATION

NEWS BRIEFS

(Continued from page 33)

Raymond L. Thomas
T. A. Edison

F. Youngwerth
Raco

• PRIMARY BATTERY DIVISION, Thomas A. Edison Industries: **Raymond L. Thomas,** field engineer, has been promoted to assistant district manager, with headquarters as before at Decatur, Ga.

Mr. Thomas was born on Mar. 27, 1926 at Savannah, Ga. Following service in the U.S. Air Force from 1943 to 1946, he began his railroad career on the Louisville & Nashville as a signal helper. Later he served as a signalman on the Southern. In 1957, he was appointed a service engineer for the Primary Battery Division of Edison. In 1960, Mr. Thomas was promoted to field engineer.

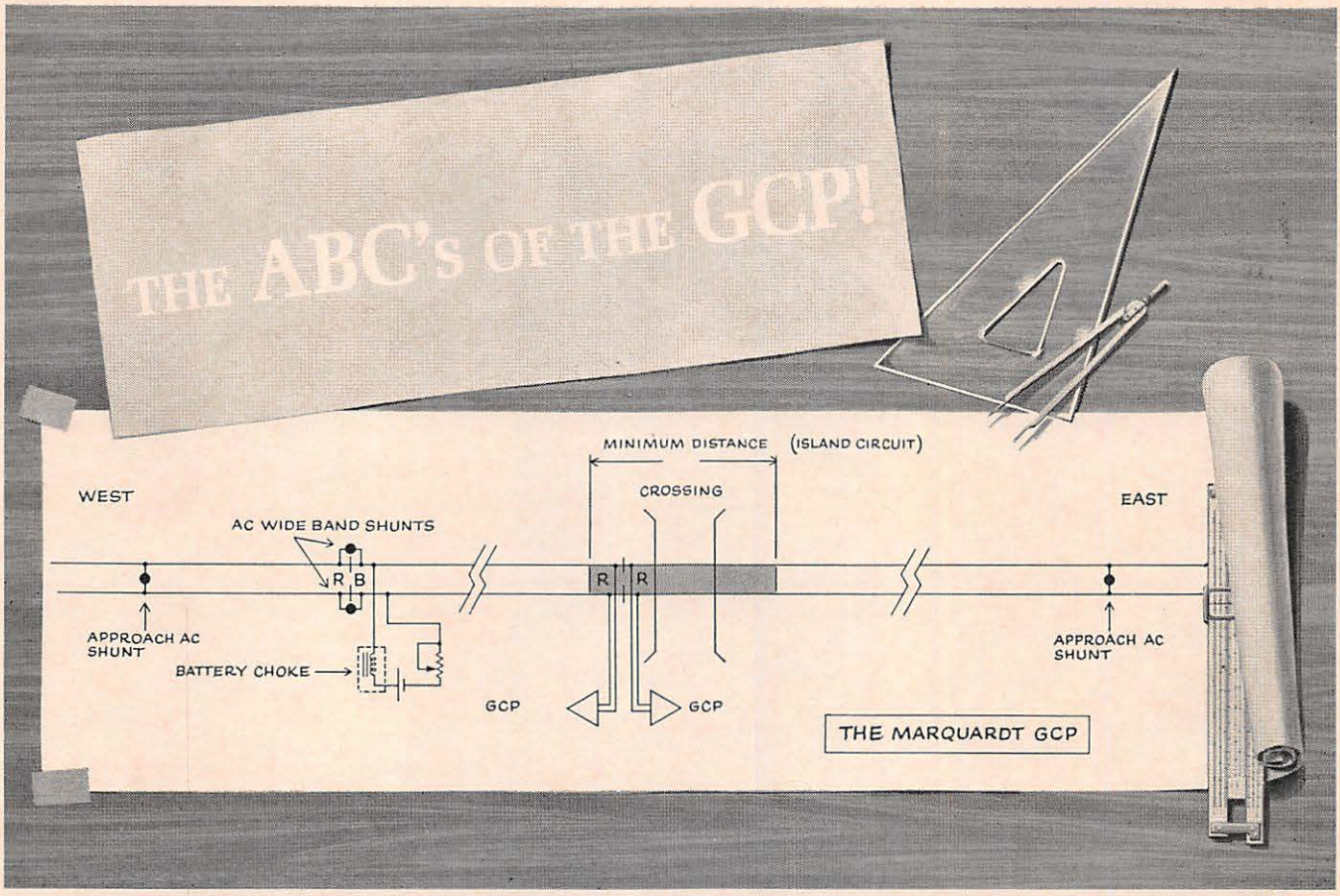
• GRS INTERNATIONAL: **Karl N. Heimbach** has been appointed manager foreign operations. He was formerly manager export department of General Railway Signal Co. **A. W. Taff,** assistant manager export department, GRS, has been appointed assistant manager foreign operations, GRS International.

• GENERAL RAILWAY SIGNAL CO.: **Hall E. Downey,** manager public relations and sales promotion, has been appointed manager promotional services.

• OHIO BRASS CO.: **W. Robert Cress,** general sales manager, has been elected vice-president, sales. Mr. Cress joined the company in 1948 as an engineer, but later transferred to the sales department. In 1952, he was appointed district manager at Cincinnati, Ohio; and appointed district manager at Chicago in 1953. He was appointed general sales manager in 1963.

• RAILROAD ACCESSORIES CORP.: **Frank Youngwerth,** chief

(Please turn to page 45)



This is how the Marquardt Grade Crossing Predictor (GCP) provides fail-safe crossing protection and reduces highway traffic delays.

The Marquardt GCP is a solid state analog control system, designed to compute speed and position of an approaching train, predict its arrival at the crossing, and activate the warning system.

The train is approaching the crossing from the west. The Grade Crossing Predictor number (1) senses an impedance corresponding to the distance from the crossing to (A) the approach shunt. As the train enters the GCP circuit, it acts as a "moving" shunt, reducing the impedance as it approaches the crossing.

Since each GCP is constantly measuring the impedance level as well as the rate of change, it can predict the train's arrival at the crossing and activate the protection system at the pre-selected warning time. Uniform warning time on constant speed trains is thus provided regardless of the train speed.

Should the train stop in the approach, the GCP no longer senses a change in impedance. An already-activated warning system will be cleared within seconds. If the warning system was not activated, of course, nothing happens. As the train resumes its approach to the crossing, the GCP again senses the impedance change and immediately activates the warning system. The warning devices will be deactivated as the last trucks clear the minimum distance (island circuit). If the train reverses direction after having gone through the crossing, Grade Crossing Predictor number (2) takes over. Highway traffic is resumed with minimum delay.

BASIC FEATURES OF THE GCP SYSTEM

- *Note that only two insulated joints (B) are actually required for GCP operation. These serve to isolate one approach from the other, establishing a defined circuit from the joints to the approach shunt (A).*
- *Where other insulated joints exist in the GCP approach circuit, AC wide band shunts (C) are used to bypass these joints, thus providing a complete circuit down one rail, through the approach shunt, and back the other rail to the GCP. The shunts are 80,000 microfarad capacitors which block the DC signal. These are encapsulated and waterproofed for burial below the frost line alongside the track.*
- *Where a battery is connected to the track, a battery choke (D) is installed in series with one of the battery leads. This prevents the AC signal from shorting through the battery. The choke has a high impedance to AC, and because of its low resistance (0.25 ohms), it has little effect on the DC circuit.*
- *The approach AC shunts (A), connected from rail to rail, complete the GCP circuit. They are located at a distance from the crossing corresponding to maximum train speed and required warning time.*
- *Built-in self-check system insures fail-safe GCP operation. The system simulates an approaching high speed train every 4.5 seconds, even when a train is on the track. Should a malfunction occur, the warning system is immediately activated.*

Write or call your Marquardt representative today. Ask him to show you how the Grade Crossing Predictor can meet your specific crossing protection requirements.

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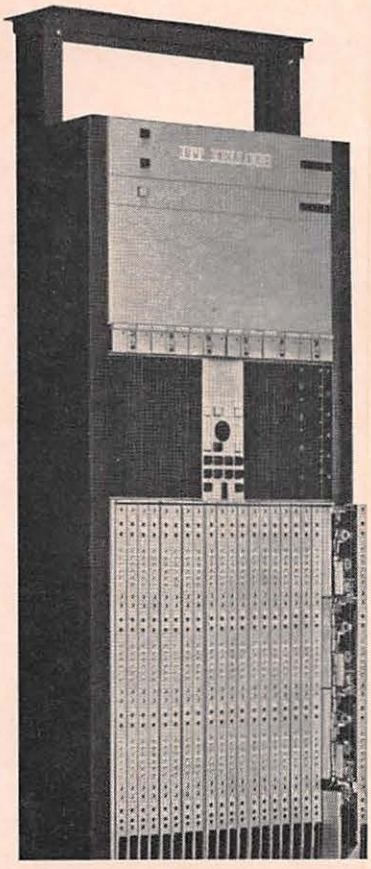
POMONA DIVISION

THE Marquardt CORPORATION

Industrial Products Department · 2882 Metropolitan Place, Pomona, Calif.

SALES OFFICES: One Old Indian Head Rd., Commack, N. Y.
Phone: 516-266-6383 / 310 S. Michigan Blvd., Chicago, Ill. Phone: 312-922-1334



The K65 Multiplex has silicon epitaxial transistors and mercury wetted relays. Now these are little things, but then reliability comes from attention to a lot of little things.

We believe that when you take care of the little things, the big things will take care of themselves.

That's why you won't have to worry about reliability when you buy the K65.

We've taken care of that big worry by taking extra care with all the little things that go into it.

For example, in addition to silicon epitaxial transistors and mercury wetted relays, the K65 has parallel amplifiers, automatic and manual switch-over of carrier and signalling generators, and redundant power supplies to assure continuous operation.

We also hermetically seal all filters for improved performance in various environmental conditions.

There are major and minor alarm indicators to alert the central office if anything should go wrong with the K65. And all control and test points are on the front of the equipment to simplify maintenance.

You'll enjoy greater reliability in the K65 because of these "little things." You'll also save space because 120 channels fit in a seven-foot bay of a standard 19-inch rack.

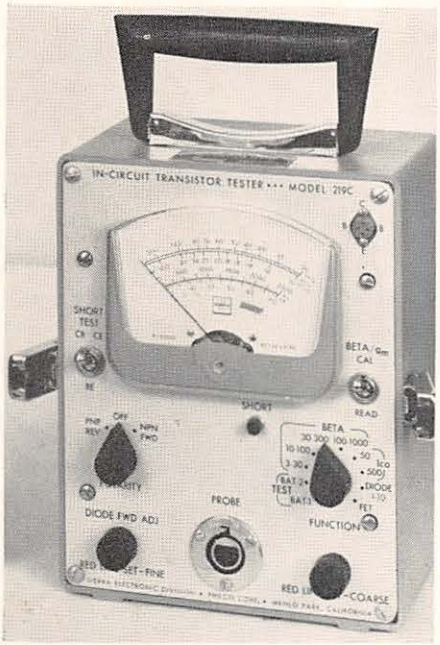
Like we said, we have taken extra care with all the "little things."

Which the K65 is.

ITT Kellogg Transmission Products, 2912 Wake Forest Road, Raleigh, North Carolina.

ITT KELLOGG

PRODUCT NEWS



Transistor Tester **RS&C 6-1**

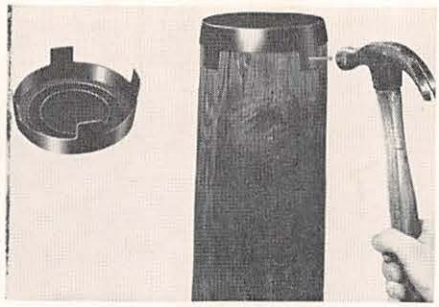
A new solid-state model 219C transistor tester is specifically designed to make rapid, accurate in-circuit transistor beta measurements. Model 219C will also render precise measurements of out-of-circuit transistor leakage current I_{co}; indicate diode reverse-to-forward ratio; measure the transconductance g_m of field effect transistors, both in and out-of-circuit; and show up a shorted junction in the transistor under test.

Test ranges are as follows: Transistor beta, maximum—30, 100, 300, and 1,000. I_{co} 0 to 50 microamp and 0 to 500 microamp. Diode reverse-to-forward ratio of 1:10. Field effect transistor transconductance g_m 0 to 2,500 micromhos. *Sierra Electronic.*

Flexible Waveguide **RS&C 6-2**

Heliax elliptical waveguide is designed to replace rigid waveguides for all microwave relay and radar applications in the 3.7 to 11.7 gc range. The elliptical waveguide consists of a convoluted copper tube of elliptical cross section. It can be supplied with factory attached connectors which mate to standard rectangular flanges.

The new long length flexible elliptical waveguide has attenuation equal to or lower than conventional rigid rectangular waveguide. The attenuation is generally one-fourth that of flexible waveguide and one-tenth that of flexible coaxial cables. *Andrew Corp.*



Line Pole Caps **RS&C 6-3**

A low-density polyethylene pole roof protective device, termed CoverCap, prevents pole roof deterioration in the forms of decay, weathering and checks. Being nonmetallic, it does not constitute a source of radio interference or set up undesirable moisture conditions caused by condensation.

CoverCaps are circular in form with a 1″ overlap. Two circular ridges inside provide extra reinforcement. They are easily secured by nailing four tabs extended from the overlap, using 2″ common aluminum nails.

According to the supplier, there appears to be no need to apply additional preservative to the roof surface of a newly treated pole prior to the application of CoverCap. For cut-off or older poles, it is recommended that Osmose pole topper fluid, 10% pentachlorophenol, be flowed on the wood surface.

CoverCaps are available in five diameter sizes: 6″, 7½″, 8½″, 9½″ and 10½″ for pole classes one through six. *Osmose Wood Preserving Co. of America, Inc.*

• WIRE REELS: Bulletin 1051 describes wire and cable reels and accessories. Photographs and prices are also included for such items as: measuring meters, drop wire, truck mounting brackets and one man warehouse reel platforms. *Suttle Equipment Corp. (CP-10)*

• SWITCH CLEANER: A new

Circle numbers for more information about products advertised on pages **1 2 3 4 6 7 8 9 11 12 25 26 27 28 29 30 31 32 34 35 36 39 RAR40 RMC40 41 42 43 HEI44 HTC44 45 47 48.**

Circle numbers for more information about products described on pages 37, 38, 40-42 and marked **RS&C 6-1 -2 -3 -4 -5 -6 -7 -8 -9** and current publications described on pages described on pages 37, 38, 41, 42 and marked **CP 6-10 -11 -12 -13 -14.**

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CITY ..... STATE ..... ZIP # .....

6/65

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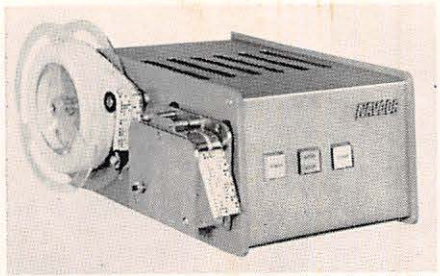
PRODUCT NEWS

bulletin R55 describes the Solo Model 59 Mist blower which can be used for cleaning and lubricating switches. A description of the machine, its usage and the characteristics of graphite switch plate lubricant No. 5559 are included in the brochure. *Joseph Dixon Crucible Co. (CP-11)*



Tape Reader **RS&C 6-4**

Model 1291 tape reader system is a table-top unit which can be used either on-line or off-line for a synchronous reading of paper tape at up to 30 characters per second. The unit weighs only 14 lb. Control circuitry is all solid-state, and a patented reel servo system minimizes tape stress, power consumption, and heat dissipation. A special pin-sensing technique permits even badly worn tapes to be read accurately, and causes virtually no tape wear itself. Illuminated push-buttons provide fingertip control of all functions. *Navigation Computer Corp.*

Radio Repeater **RS&C 6-5**

A new base station repeater provides two-way radio communications between maintenance of way crews and radio equipped trains. The unit consists of an equipment housing containing two complete radio sets operating on different frequencies and a 54-ft Rohn crankup tower. Equipment housing and tower are mounted on a two-wheel automobile type-trailer which can be hauled by a truck or other motor vehicle. The tower can be set to a convenient length for hauling. The trailer tower unit has outriggers to provide stability to the tower when it is in the raised position.

A feature of this mobile repeater is that with use of a filter duplexer, the two radio sets, operating on

(Please turn to page 40)

"IT'S 'MOST USEFUL' TO US,"

Say the readers of *Railway Signaling and Communications* because it provides outstanding coverage and excellent technical reporting of the fast-paced changes taking place in the field of railroad communications and signaling. It is important that those charged with responsibility for these vital operations be fully and currently informed of new developments in that area. If you are a reader . . . and not a subscriber, the order card attached is your invitation to receive *Railway Signaling & Communications* every month. Signaling and communications officers and supervisors use *Railway Signaling & Communications* — the only technical monthly serving this branch of the industry exclusively—in order to keep up to date with new equipment and new methods. We recommend that you fill out the adjacent card and mail it today!

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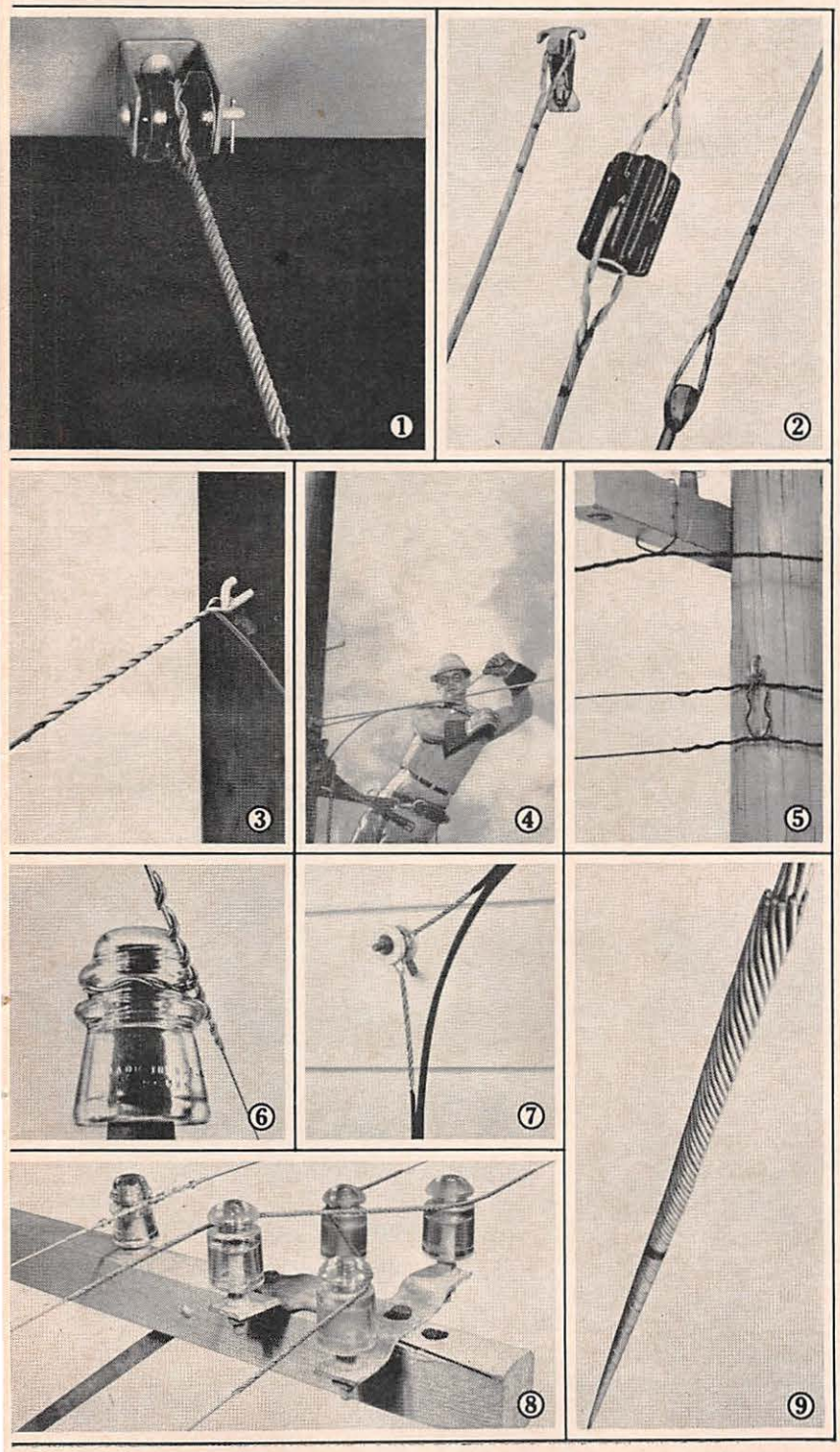
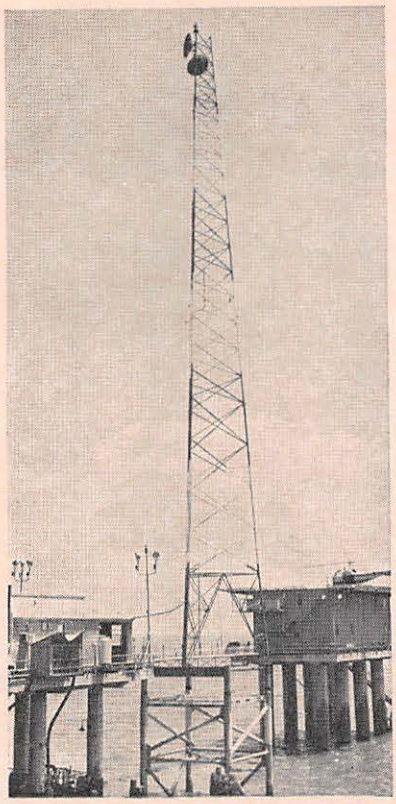
A Fitting Line for Communications Construction



PREFORMED fittings are widely accepted for modern construction, repair and maintenance of communications systems. Use is on all kinds of construction from open wire to Figure 8. With PREFORMED helical type fittings outside plant can be constructed today with very few bulky fittings. All PREFORMED products offer these advantages: Fast, easy to apply; lowest installed cost; cannot shift or loosen; no maintenance required; low concentration of stresses; material compatibility. Typical products: ① PREFORMED DEAD-ENDS for line wire. ② GUY-GRIP® dead-ends for guying poles and uprights. ③ DEAD-ENDS for C-Rural or drop wire. ④ PREFORMED DEAD-ENDS for false dead-ending. ⑤ PREFORMED TANGENT SUPPORTS for suspension of C-Rural. ⑥ COMMUNICATIONS TIES for safe attachment of line wire to insulators. ⑦ DROP WIRE DEAD-ENDS for Figure 8 service entrance. ⑧ ARMOR RODS for protection at insulators and transposition brackets. ⑨ PREFORMED SPLICES join wire or strand; restore full electrical and mechanical strength to severed or damaged sections.

Write for data, specifying product interest, to: PREFORMED LINE PRODUCTS COMPANY, 5349 St. Clair Avenue, Cleveland, Ohio 44103; dial 216-881-4900.

PREFORMED



ROHN TOWERS "STAND UP" to Hurricane Hilda!

A series of ROHN micro-wave towers, used on Shell Oil Company offshore platforms near the Louisiana coast, took on the full fury of "Hurricane Hilda" and withstood the test!

Designed for *50 pound windload per square foot,* these towers stood up to winds known to have been well in excess of this.

For towers proved in design, engineering and construction, specify *ROHN.* Complete tower, lighting kit, microwave reflector, and tower accessory catalogs and specifications available on request. Representatives world-wide.

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"World's Largest EXCLUSIVE Manufacturer of Towers; designers, engineers and installers of complete communication tower systems."

REELS roll *SMOOTHLY* on ROLL-A-REEL

for pay-out or take-up of anything on reels

No pulling heavy reels . . . no pushing . . . JUST LOAD and away you go!

- **Easily portable**
- **No jacks**
- **Handle any reel diameter**
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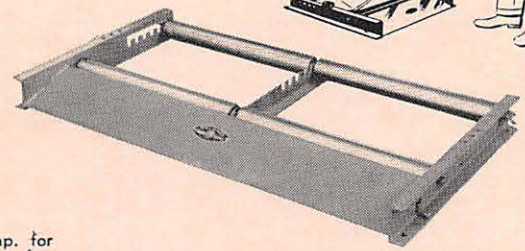
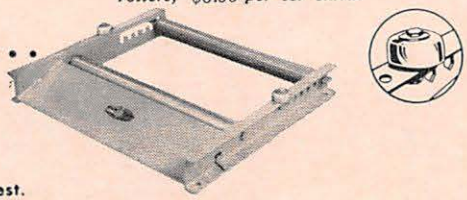
- **Slanted front**
- **Ball-bearing adjustable rollers**
- **Positive roller lock for unloading**



STYLE B — 4,000 lbs. cap. for 1 reel up to 48" wide; or for 2 reels up to 24" wide each. Weight 110#.
PRICE $89.50
f.o.b. Cincinnati

All are drilled for optional auxiliary ball-bearing side rollers, $6.00 per set extra.



STYLE A — 2,000 lbs. cap. for reels up to 28" wide. Weight 60#.
PRICE $49.50
f.o.b. Cincinnati

- **Special sizes on request.**

ROLL-A-REEL

4636 Reading Road
Cincinnati 29, Ohio

PRODUCT NEWS

(Continued from page 38)

different frequencies, make use of a single antenna. *Motorola Communications & Electronics Inc.*

Battery Handle **RS&C 6-6**

A throw-away carrying handle is now being supplied with each Eveready CG-124 and CG-212 primary battery shipped by the manufacturer. The batteries are equipped with carrying lugs, and the expendable handle will simplify and expedite their installation. *Carbon Products division, Union Carbide Corp.*

Fault Locator **RS&C 6-7**

A new portable device, with which repairmen can trace the course of buried communications cable and pinpoint defects from the

surface of the ground is a battery-operated system consisting of a 15 lb transmitting unit to generate a pulsed signal through the cable's sheath; and highly sensitive, hand-held probes which can detect these electrical signals through several feet of earth. It is the discontinuity in the insulation of the cable that the new Delcon model 4900A device utilizes for fault location.

After test measures common to all cable repair procedures have indicated the particular underground section in difficulty, the repairman starts his search at the surface pedestal terminating the section. Here, electrical contact is made with the cable and the Delcon transmitter unit is grounded. Since the system will establish a circuit through the cable inner sheath to the fault point and then back to the ground stake near the pedestal, it must generate the proper signal level which is set by using single control in conjunction with a flashing light.

With the circuit established, the repairman is ready to locate the precise underground course and also the depth of the cable at any point. He has a lightweight, 3-ft long probe, and a camera-sized receiver unit which reproduces the pulsed signal through a loudspeaker. The receiver unit produces a null signal when pointing directly to the energized cable. Moving the probe to either side of the precise course of the underground cable produces an audible signal. As he passes the fault point, the signal strength diminishes sharply to indicate at once the fault's approximate location within 5 to 10 linear ft.

Since the inductive probe senses a null when pointed directly at the cable, the cable depth can easily be determined by moving the probe away from the cable at a 45 deg angle. Under these conditions, the depth of the cable will equal the surface distance between the probe and the point directly over the cable.

Repairmen with no special training in this technique can locate faults to within a fraction of an inch by using the Delcon unit's second probe, which connects to the same battery-powered transistorized receiver. With two metal prongs, the conductive probe is inserted into the ground along the fault zone located before by the inductive probe.

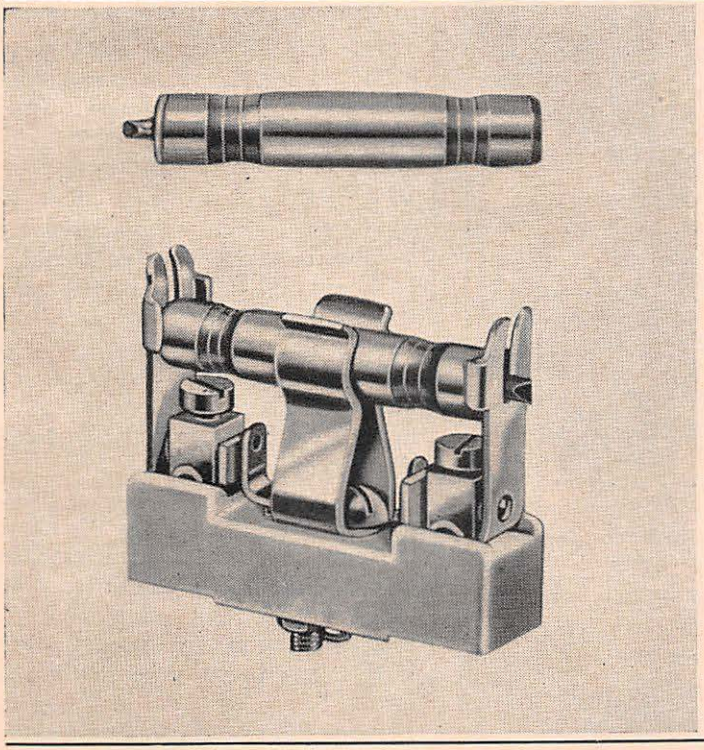
When a null signal is noted, in line with the cable and at right angles across the known cable course, the fault is located exactly. The craftsman has pinpointed the epicenter among equal voltage points in the conductive field emanating from the ground at the cable fault.

The Delcon Model 4900A underground fault locator will operate for approximately 50 hr on a standard 6-volt lantern battery, with output automatically regulated for changes in battery voltage. Faults can be located over underground sections exceeding a mile in length. *Delcon Division, Hewlett-Packard.*

• CLOSED CIRCUIT TV: A new booklet describes several closed circuit TV systems that may be used for remote gate watching and area surveillance, remote supervision, materials handling, and observation of processes and operations in hazardous areas. Bulletin TIC 1449-C

(Please turn to page 42)

CUT YOUR MAINTENANCE COST AND GIVE BETTER PROTECTION



One three-electrode gas-filled protector replaces the normal pair of two-electrode protection. It handles heavier discharges and its propensity to discharge both wires of a line simultaneously affords better protection and cuts maintenance costs.

TYPES AVAILABLE

Code No.	Striking voltage dc	repetitive discharge joules	Current Ratings
16A	150-350	100 (peak current over 10,000A)	20,000A (10/20 impulse)
16B	300-500		20A ac for 1 sec repeatedly
16C	500-900		150mA ac for 3 hrs

Operate Time Generally less than 1 microsec.
Dimension $1\frac{10}{16}$ in. x $\frac{3}{8}$ in. dia. (49 x 9 mm)
Mountings Single and strip also cable terminal and pothead insulator.

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BARNERT PLACE, BOX 126, HOHOKUS, NJ 07423 U.S.A. PHONE (201) 652—8030

TA 2088

(Continued from page 41)

provides photographs of equipment as well as discussions of usages. *Motorola Communications and Electronics Inc., (CP-12)*

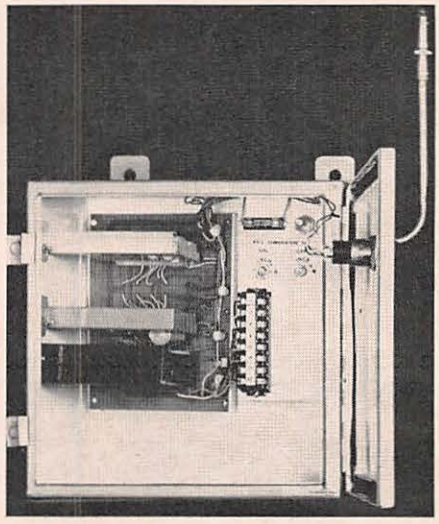
Utility Truck **RS&C 6-8**

A refined and improved version of its original non-overcenter aerial device to meet the demand for a tall, two-man unit can be installed on a smaller, more mobile and less expensive truck than the present 46′ and 50′ Hotstiks.

The new, two-man 46′ aerial device, model H/S-N46, features integrated mainframe and outriggers, Uni/Dyne II turrent, tapered beam lower boom, Epoxiglas upper boom, full metering one-hand controls with the patented Pitman parallelogram bucket leveling system and the roomy two-man bucket formerly used in earlier aerial devices.

Minimum chassis recommendations for the new aerial device call for a 5,000 to 6,000-lb curb weight chassis with 7,000-lb front axle and 17,000-lb rear axle. The chassis should also have a minimum of 174″ wheel base for cab forward chassis designs.

The H/S-N46 Hotstik provides the same electrical isolation as the Pitman heavy-duty Hotstik and is exceptionally suited to working energized conductors. The unit comes completely wired for the future installation of leakage monitoring equipment for bare hand work. The two monitoring circuits include one to monitor the inside and outside of the Epoxiglas upper boom and the other to monitor the non-conductive hydraulic hose assemblies within the boom. *Pitman Mfg. Co.*



Snow Detector **RS&C 6-9**

A new solid-state control system not only provides for remote control of electric or gas fired switch heaters, but also provides for automatic snow detection. The new system will operate on 24 volts DC or 110 volts AC. The power consumption is 75 ma for the snow detector unit. One snow detector unit can be used to control as many as 10 switch heaters within 1,000 ft of the detector.

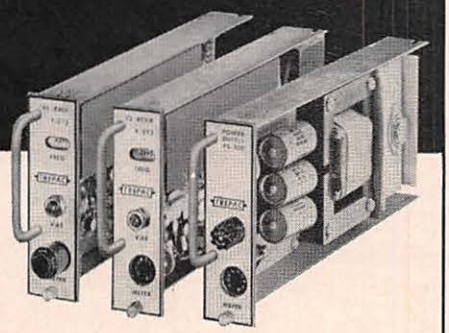
A feature of the control system is that rail temperatures can also be brought into the control function in addition to ambient temperature with either the presence or absence of snow. Rail temperatures, as recommended by the manufacturer, are 50° F (switch heaters turned on) or 110° F (switch heaters turned off). *Thermocon Co.*

• WAVE ANALYZER: The all solid-state model 128A high-frequency wave analyzer is described in a new bulletin. The unit covers a continuously tunable range of 10 kc to 15.2 mc. A new accessory expanded scale meter permits accurate analysis of any 2 db sector in the instruments range. *Sierra Electronic division of Philco. (CP-13)*

• RADIO RECEIVERS: Bulletin ECR-1018B describes Message Mate pocket radio receivers with both tone signaling and voice messages. The units work with conventional VHF 2-way radio systems in the 25 mc to 50 mc band or in the 150.8 mc to 174 mc band. *General Electric Co. (CP-14)*

TREPAC®

"BUILDING BLOCK" TONE SYSTEM



TYPICAL TRANSMITTER-RECEIVER -POWER SUPPLY MODULES.

TYPICAL 19 INCH RACK MOUNTING.

The **TREPAC DATATONE System**, a complete line of "off the shelf" modular tone equipment, provides an economical means of expanding existing or new control and communications networks, Multi-channel control and/or teletype, with or without voice communications, may be operated over a single communications link.

"Building block" design permitting budget controlled growth capability as well as compatability with existing equipment, permits the design engineer the freedom necessary to develop a communications system tailored to his individual needs.

Both AM and FSK transmitters and receivers, power supplies, loop D.C. supplies, regenerative repeaters, and two-way D.C. repeaters, telemetering adapters, diversity combiners, and an extensive filter line are available from stock.

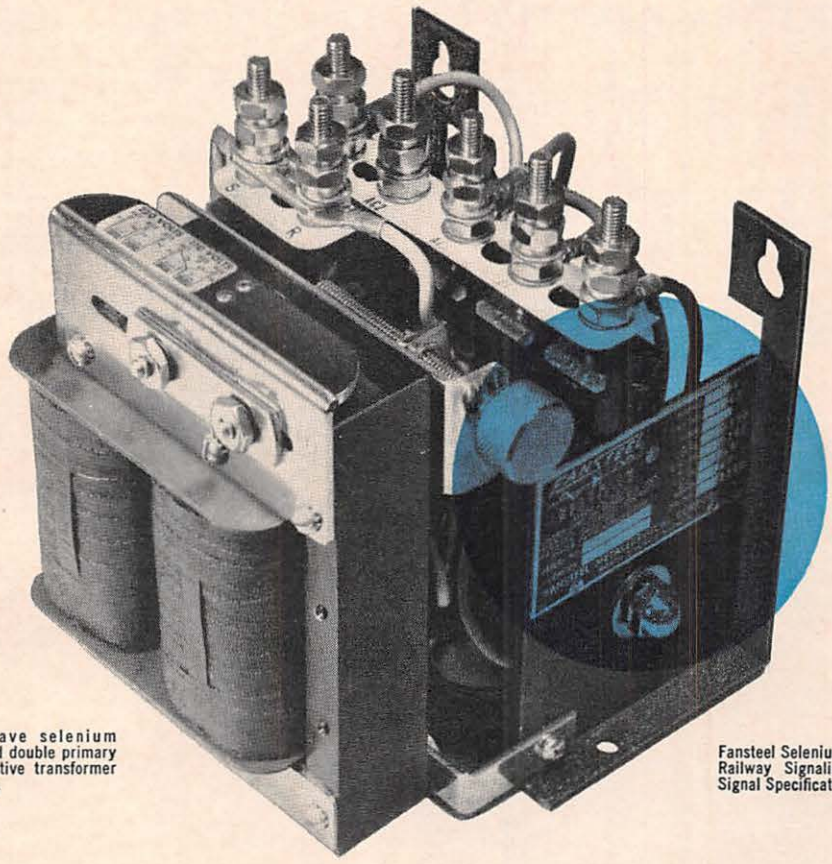
Each module has a test socket in the front panel which allows "by the numbers" testing of operating systems by inexperienced personnel. This, together with plug-in frequency determining elements and single type plug-in transistors, permit a realistic approach to the maintenance problem.

For additional information, contact: Datatone Division RS:

TREPAC CORPORATION OF AMERICA

30 W. HAMILTON AVE., ENGLEWOOD, N. J. • PHONE: (201) 567-3810 • TWX (201) 567-4977

SOLID STATE ELECTRONICS for TELECOMMUNICATIONS



Model DT full-wave selenium rectifier with standard double primary (110-220 volts); reactive transformer for two-rate charging.

Fansteel Selenium Rectifiers for Railway Signaling meet AAR Signal Specifications No. 229-48

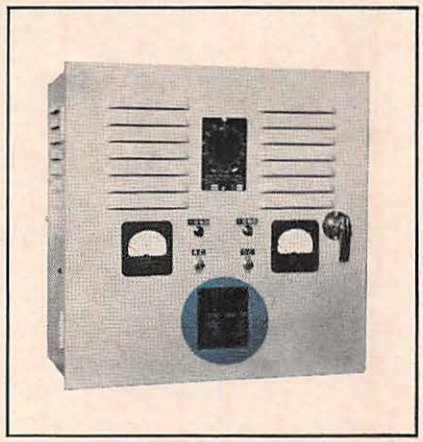
Why railroads have used Fansteel rectifiers and battery chargers for over forty years

Fansteel signal rectifiers have come a long way since the days of the Balkite Rectifier.

In those more than forty years, the Fansteel line has grown to include over 1000 catalog items, ranging from the popular Model DT selenium rectifiers to the Model DL automatic selenium battery charger and the high-accuracy Constant Potential silicon chargers for microwave installations.

Fansteel's acceptance by the railroad industry is traceable to its experience, completeness of line, and its willingness to apply the highest level of modern electrical and electronic technology without sacrificing equipment reliability.

Model DL Automatic Battery Charger



Constant Potential Battery Charger

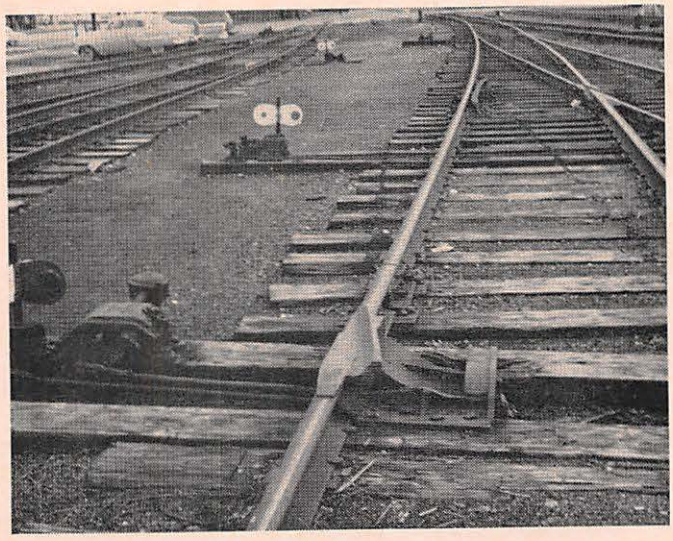
Fansteel signal rectifiers have proven their dependability in virtually every type of railway application. They meet all existing AAR standards as they apply to this equipment.

Finally, Fansteel offers immediate delivery of most signal rectifiers and battery chargers from extensive warehouse inventories. For technical literature just write to:

FANSTEEL

FANSTEEL METALLURGICAL CORPORATION
Number One Tantalum Place
NORTH CHICAGO, ILLINOIS, U.S.A., 60064

A Derail should MEAN BUSINESS ...and look it!



When you see a Hayes Model HB Derail in "open" position (on the rail) its purpose is immediately apparent: it commands all traffic to stop at that point. Disobedience of this order brings instant derailment and a quick halt to further movement.

Yet, when "closed" (off the rail) Model HB leaves the track unbroken and free from any possibility of a derailment. Movements through the fouling point are normal in all respects. This cannot be said of other forms of derailing devices, such as a switchpoint.

The basic efficiency of this Hayes derailing concept becomes more important as railroads continue to improve their operating performance. Today, as never before, "Safety demands a Hayes Derail at every turnout."

Free new catalog on request.

Hayes Track Appliance Co.

RICHMOND, INDIANA

Specialists since 1903 in side track security.

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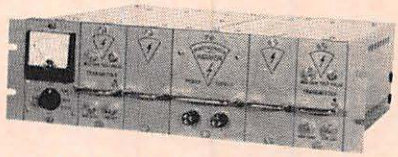
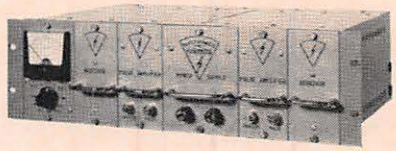
United States Steel Corporation 26

Western Railroad Supply Co. .....Cover IV



510BT Dual Channel Transmitter



510BR Dual Channel Receiver

ELECTRONICS HARMON

for proved hot box carrier equipment

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check these advantages:

- Silicon Solid State
- Modular Fiberglass. P.C. Board Construction
- Metered Test Panel
- Built-In Calibrated Test Pulse
- Regulated Power Supply
- Proven Reliability in Hundreds of Installations
- Operates with any Detector or Recorder
- Personalized Service

for all your carrier needs, call collect

HARMON ELECTRONICS, INC.

GRAIN VALLEY, MISSOURI · 816 2493338, 2493444

(Continued from page 34)

signal engineer, Erie Lackawanna, has been appointed assistant to the president, succeeding **Paul Martin,** appointed general manager, Cresskill division.

Mr. Youngwerth was born in Garfield, N.J., on Nov. 23, 1909. He began his railroad career on the Erie in 1929 as a signal helper. He advanced through various positions, being appointed assistant signal supervisor in 1943. Two years later he was appointed signal inspector, and in 1946 was promoted to office engineer signals. A year later, Mr. Youngwerth was appointed assistant signal engineer. In 1956, he was appointed assistant general superintendent communications and signals, and a year later promoted to general superintendent C&S. He retained this position when the Erie and DL&W were merged. In 1964, Mr. Youngwerth's title was changed to chief signal engineer.

• RAILTRON CORP.: **William M. Pelino,** chief technical advisor, Servo Corp. of America, has been appointed president of this newly formed organization which will be engaged in applications engineering of electronic systems to railroad operations. **Raymond A. Moenich,** assistant manager of field engineering, Servo Corp., has been appointed director of services. **Len E. Keeton,** southeastern district manager, Servo Corp., has been appointed director of marketing and sales. The above mentioned men will be at the company's headquarters in Richmond, Va.

• RACON EQUIPMENT INC.: Has appointed several firms as sales representatives for its products including a recorder for checking the operation of flashing-light signals at railroad-highway grade crossings. T. C. Johnson Co., of Cleveland, Ohio and Atlanta, Ga., will represent Racon in eastern U.S. Racon, located in San Diego, Calif., will handle its own sales on the Pacific Coast and as far east as Denver, Colo. Lyman Tube & Supply Co., Montreal, Que., will represent Racon for all of Canada.

• RADIATION INC.: **Thomas H. King,** corporate representative for Stelma, Inc., has been appointed marketing manager-communications. **Ralph A. Johnson,** director program management, has been appointed general manager, control systems division. He will supervise a new unit that was formed to manufacture and sell Paricode and Locotrol supervisory control line purchased from North Electric Co., and process controls to be marketed under an agreement with Data Systems, Inc.

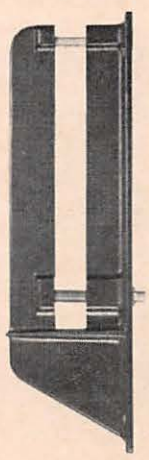
"It could have been worse if these were dwarf signals."

• SIERRA ELECTRONICS division of Philco Corp.: **Robert L. Kost** has been appointed advertising and sales promotion manager.

• SERVO CORP. OF AMERICA: **Henry Blackstone,** president, reported that the company has been involved in patent litigation with General Electric Co., since 1959. Following a ruling of the U.S. district court upholding the validity of Servo's patent on railroad hotbox detectors, but rejecting Servo's claim for damages for unfair competition in the appropriation of its engineering data, the U.S. court of appeals for the 4th circuit reversed the ruling of the district court with respect to Servo's patent and also reversed the district court holding that Servo was entitled to recover damages from GE on the Servo claim for unfair competition. Servo, said Mr. Blackstone, has not yet determined whether it will seek a review of the holding on the patent in the U.S. Supreme Court or in another litigation.

• STROMBERG-CARLSON CORP.: **George W. Ayres** has been appointed manager of engineering at the Charlottesville, Va., plant (formerly U.S. Instrument Corp.).

LOW BRIDGES? SINCLAIR'S VHF TRAIN ANTENNA IS ONLY 6¼" HIGH!



This new low-cost, low-silhouette, Model 221A train antenna is engineered for trouble-free, two-way transmission and reception even in locations where buildings, bridges and tunnels generally cause interference. It is designed for the 158-164 Mc range with a power rating of 200 watts . . . is made from rust-resistant anodized aluminum . . . and meets all AAR specifications. Easily bolted to any flat surface, the Sinclair Train Antenna is rugged enough for use as a mechanic's "handle" when climbing on the engine. The Model 221A is furnished complete to any color specifications at no extra cost.

DUPLEXER WITH ONLY 0.5 Mc SEPARATION

Now . . . dual simplex or full duplex operation is possible with high isolation between transmitter and receiver in the crowded VHF band. Sinclair's F-150-4ER duplexer combines low initial cost with high quality construction for years of trouble-free base station or locomotive use.

Write today for complete FREE details of all Sinclair antennas, duplexers, multicouplers and other fine communications equipment.

SINCLAIR RADIO LABORATORIES, INC.
523 Fillmore Avenue
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Tonawanda, New York

Report to Readers

As indicated in the Editor's Corner in March, we sent inquiries to 700 readers asking them to evaluate our January issue. We received 132 replies. We asked them to rate the articles, departments, and editorial as follows: Very Good- well written and helpful; Satisfactory- but could be better; and Not Interested.

Sixty-four percent of the 132 readers replying rated the Editor's Corner as very good, while 29% rated it satisfactory and 7% were not interested. The article on railroad spending for this year, including the tabulation of equipment installed last year earned the following ratings: 76% rated it very good; 22% rated it satisfactory, and 2% were not interested. The article on the FCC reopening the Telpak hearing drew 36% very good ratings, 40% satisfactory ratings, and 24% of the readers were not interested.

News briefs rated very good with three-fourths of the readers replying to the survey, and one-fourth rated it satisfactory. About half of the respondents rated railroad personnel very good, with 35% rating it satisfactory. Supply trade news received only a 44% very good rating, 45% satisfactory and 11% not interested. Product news was rated very good by two-thirds of the respondents, and one-third rated it satisfactory.

Below are some of the comments from readers:

Naturally with my position, it seems that you are giving more coverage to communications in news articles as well as Products News. I realize that communications is just now on the move, however, signaling is not at a standstill.

Engineer Signals System

I would like to see detailed explanations of cybernetics and solid state systems used in railroad and subway signaling, a short section every month explaining the function of different types of signaling equipment, e.g.: switch machines, automatic train dispatcher, types of interlocking plants.

Signal Maintainer

Very few of our Signal force have any knowledge of electrical engineering and their position is that RS&C is interesting only to the Supervision. Suggest more articles like those on grounds p 21, March 1963; presence detectors June 1963 p 30; and track connectors p 30 & 33, April 1964.

Signalman

Summary of S&C installed, 1962-64, also equipment installed in 1964 is excellent.

Supervisor Signals & Communications

Should be some coverage about what other transportation industries are doing in the communications field, truckers, airlines etc. Give railroads some new things to think about!

Superintendent of Communications

RS&C coverage in the signal field is always interesting.

Signal Engineer

I would like more Data Sheets.

Signal & Electrical Supervisor

I miss the Question and Answer section and the Data Sheets.

Equipment Installer

The FCC Telpak article could have been written with more specific clarity.

Communications Superivsor

In the past, it was the opinion of a great many people on the railroad that the signal departments were only there to delay trains. Your Editor's Corner in recommending that signal officers correct this type of idea is, if it will be accepted by the officer, needed to assist in putting the signal department in better light throughout the industry.

Assistant Engineer

I like the 25-50 years ago page.

Lead Signal Maintainer

We find articles well written and interesting.

Superintendent

RS&C interesting and very well put together.

Foreman

In view of the increase in importance —more space might be devoted to communications facilities.

Manager Signals & Communications

You are doing a wonderful job with the magazine and as I enjoy reading all parts of it, I have no complaints. I do appreciate any items that will improve methods of maintaining the modern signal systems and which are of benefit to the men who are working in the field.

General Chairman & Grand Lodge Representative

Would like to see more on hotbox detectors, overlay track circuits and the experience other railroads are having with them, what steps do they take to cut down failures by lightning, etc.

Assistant Signal Supervisor

I would like to see more articles on trouble shooting in signaling and also on ways to educate personnel in modern CTC.

Assistant Signal Supervisor

RS&C does a good job. It's hard to say where improvement could be made. I'd hate to see any of the regular departments dropped, as each part serves a good purpose.

Signal Engineer

I consider RS&C the No. 1 magazine in our fields.

Communications & Signal Supervisor

"What's the Answer" and "Kinks" not appearing in recent issues, were most informative, particularly for maintenance personnel. Would like to see these reactivated. Seems to me it would stimulate circulation among maintainers, test men, inspectors and supervisors.

Assistant Chief Engineer Communications & Signals

So far so good although the big item points to communications. Would like to see something on the latest in signal circuits.

Relay Inspector

I find your magazine very stimulating and an asset to my work. I have a little constructive criticsm though. I have been signaling for 4 years and would like to see a little more information on advanced electricity but not too much electronics. Most of the Canadian signalmen are new at the job and many, like myself, have not yet had the time to go too deeply into electronics as yet.

Signal Apprentice

Most of your articles are informative to my particular trade. Overall, your splendid publication is educational and I use it for reference from time to time.

Signal Maintainer

Some very interesting statistics in your January issue and your magazine in general is very good, keep up the fine work.

Signal Maintainer

I would appreciate more technical data on the various systems in use by signal companies. In this way we would have a better knowledge if these systems could be employed by our particular road. And, if they were used, at least a fairly good idea of their working would be already achieved.

Assistant Signal Engineer

Your handling of all subject matter is very good. I look forward each month for the magazine and read it cover to cover.

Assistant Vice-President Operations— Chief Engineer

More bits per bandwidth

The surest way to save money is to get *more* of what you're shopping for *at no extra cost*. That's why we recommend our 25A data and telegraph transmission system. As the chart demonstrates, it can handle higher data speeds within less bandwidth than any other system made. Compare these facts:

1. The 25A handles as much data in a 170-cycle channel as others do in 340. In fact, the 25A is the *only* existing system that can handle the new four-row keyboard teletypewriters in a 170-cycle channel.
2. It is ideal for either data or telegraph transmission because of its various speed arrangements.
3. Interface facilities are available for almost every possible application.
4. All circuitry is solid-state, including input keyer and output driver. And the driver is fully short circuit protected.
5. Automatic loop current regulation is built in for telegraph operation.
6. Plug-in options permit standard loop or hub arrangements.
7. It is completely compatible with international standards.
8. It operates on data or telegraph voltages.
9. Likely users are railroads, pipelines, electric utilities, telephone companies, and the government.
10. The 25A is for sale by its maker, Lenkurt Electric Co., Inc., headquartered in San Carlos, California. Other offices in Atlanta, Chicago, Dallas, and New York City.

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NOW: LESS WEIGHT, LESS MAINTENANCE with . . .

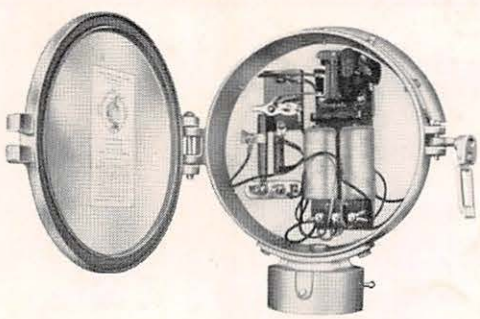
WESTERN

ALUMINUM HIGHWAY CROSSING BELLS

with BELL STEEL GONGS TYPES 222 AND 1275

WEIGH 40% LESS THAN CAST-IRON BELLS

These new Western Aluminum Highway Crossing Bells, Types 222 and 1275, are lighter in weight and as reliable as ever. Specifically: the Type 222 Aluminum Bell weighs only 29 lbs., as against 48 lbs. for that of cast iron, and the Type 1275 in Aluminum weighs only 20 lbs. against 32 lbs. for the cast iron. Aluminum parts include: housing, cover, rainshield, and mounting socket. These changes make quite a difference in weight. But there's no difference in quality and tone: for they have the same dependable mechanism as before; as always, parts are fitted snugly to assure bug-, dust- and weather-proofing, and *the gong is still made of bell steel.*



TYPE 222: Twelve-inch bell steel gong; 200 strokes per minute; 6 to 600 volts D.C., as specified.

TYPE 1275 (not shown): Same as Type 222, except with eight-inch bell steel gong (softer tone); 225 strokes per minute; 6 to 16 volts D.C.

Making greater use of aluminum throughout, these Bells are complementary for use on Western's Aluminum Highway Crossing Signal, TYPE A-479-A, with Flashing Light, TYPE 970-201, on the Aluminum Cantilever Assembly, TYPE A-740, also on Model 10 Gates.

Over 100,000 Western Bells in use.

For additional information on bells and bell mechanisms, see your WRRS Catalog, Section B, or write to us:

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